United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation
with Texas
AgriLife
Research and
Texas Tech
University

Soil Survey of Hockley County, Texas

How To Use This Soil Survey

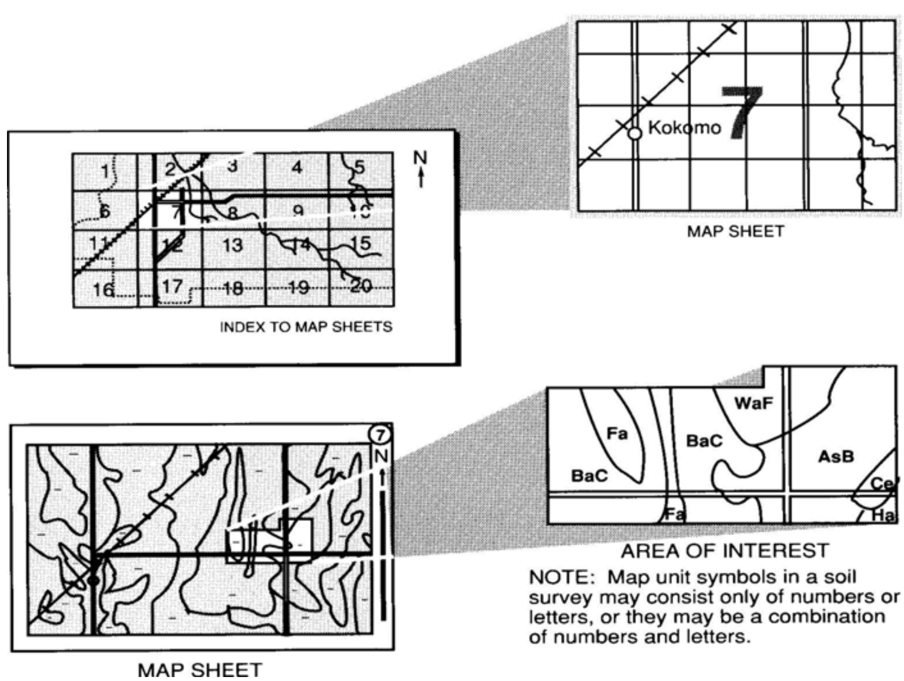
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Go to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey special report is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including Texas AgriLife Research (formerly Texas Agricultural Experiment Station), and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey

Major fieldwork for this soil survey was completed in 1999. Soil names and descriptions were approved in 1999. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1999. This survey was made cooperatively by the Natural Resources Conservation Service, Texas AgriLife Research, and Texas Tech University. The survey is part of the technical assistance furnished to the Hockley County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Cotton crop prepared for harvest on an Amarillo fine sandy loam, 0 to 1 percent slopes.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is *http://www.nrcs.usda.gov*

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Issued 2009

Foreword

This soil survey contains information that affects land use planning in Hockley County. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Planners can use the report to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and modify or improve the environment.

The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help users identify and reduce the effects of soil limitations on various land uses. The user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this report. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the report is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or Texas AgriLife Extension Service.

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Soil Survey of Hockley County, Texas

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Texas AgriLife Research and Texas Tech University

This soil survey updates the soil survey of Hockley County published in 1961 *(17)*. It provides additional soils information and detail on soil properties and interpretations. It also has larger maps, which show the soils in greater detail.

Hockley County is in northwestern Texas, south of the Panhandle and on the Llano Estacado. It is bounded on the east by Lubbock County, on the south by Terry County, on the west by Cochran County, and on the north by Lamb County (fig. 1). It was named for George W. Hockley, the Texas Secretary of War. The county's center point is approximately 33°36' north latitude and 102°21' west longitude, thirty miles west of Lubbock. Elevations range from 3,300 to 3,650 feet above sea level *(1)*.

Hockley County makes up approximately 908 square miles, or 581,556 acres of level prairies and rolling plains in the center of the Llano Estacado. The county is square and about 30 miles from north to south and 30 miles from east to west.

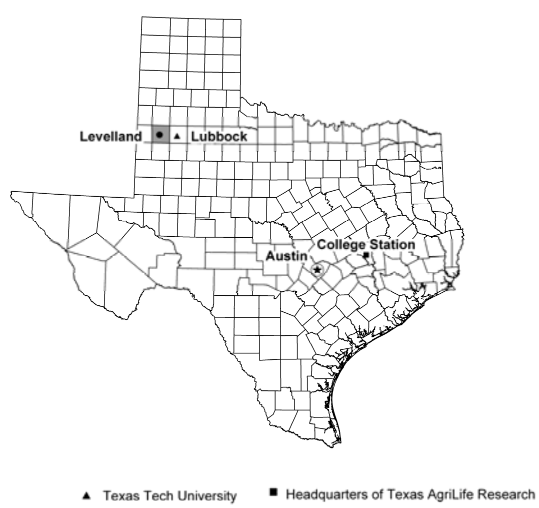

Figure 1.—Location of Hockley County in Texas.

Levelland is the county seat and has a total resident population of 12,866 *(2)*. The town has three elementary schools, one middle school, one junior high, a large high school, South Plains Junior College, and a public library. Other towns in the county are Anton, Ropesville, Smyer, and Sundown. In addition, several small communities with a population less than 200 include Arnett, Clauene, Lockettville, Opdyke, Pep, Pettit, Roundup, and Whitharral. In 2000, the total resident population for Hockley County was 22,716 *(2)*.

Hockley County is in Major Land Resource Area 77, the Southern High Plains, and is part of the Central Great Plains Region *(3)*. The landscape consists of smooth, nearly level tablelands on a high plateau. Slopes are linear, neither concave nor convex and tilted to the east at an average grade of 10 feet per mile. Except for a few low rises and numerous playa depressions, the main surface is smooth. Playas are shallow, dish-shaped depressions that range from 5 acres to over 100 acres in size. They consist of a central basin and an outer rim that slopes to the main surface where runoff is held. In the northwestern part of the county are two large saline lake basins. The most prominent is Yellow Lake, which lies within Yellow House Canyon along the Hockley and Bailey County line. The basin is over 6,000 acres in extent and at its lowest elevation is approximately 160 feet below the surrounding plains. A few miles west is Silver Lake, which lies along the Hockley and Cochran County line. The basin is over 2,700 acres in extent and at its lowest elevation is approximately 60 feet below the surrounding plains. Slopes surrounding these basins are very gently sloping to moderately steep. The slopes on the floor of the lakebed are nearly level. These saline lakes normally have a high water table that is very high in dissolved salts. During some years, the lakes are ponded intermittently from runoff of local rainfall. The ponding duration ranges from brief to very long and, as the shallow water evaporates, a white salty crust forms on the dry surface. Hockley County has two small stream channels, or draws, that dissect the plains. Characteristically these streams are dry but occasional flooding can occur briefly during heavy rainfall events. Yellow House Draw is in the northern part of Hockley County and drains eastward into Lubbock County. Lost Draw is in the southwestern part of the county and drains to the southeast into Terry County.

The major land uses in Hockley County are cropland and rangeland. In 2008, approximately 466,782 acres in the county is used as cropland; 76,965 acres as rangeland and wildlife; 2,000 acres as pasture and hay land; and 35,809 acres as urban or built-up land *(4)*.

General Nature of the Survey Area

This section gives general information about the county. History, economic enterprises, natural resources, transportation facilities, and climate are described.

History

In 1876, the Texas legislature formed Hockley County from lands formerly assigned to Bexar and Young Counties. Because settlers were slow to move into the area, however, the county was assigned to Lubbock County for administrative purposes until 1920. Until the early twentieth century, the area was dominated by a few large cattle operations. The Causeys were the first settlers in the area; after several years of buffalo hunting in Kansas and Texas, they established a base at Yellow House Canyon in 1877 and built the first house in the county. When the buffalo herds were depleted, the Causeys went into the bone business, and in 1882, they established a ranch. In 1885, however, the XIT Ranch, one of the state's largest cattle-raising ventures, was founded in the area, and the Causeys were forced to move.

The XIT expanded to include the northern third of Hockley County; Virtually all of Hockley County was owned by a few men by the 1890s. There were no census returns for Hockley County until 1900, when forty-four people were found living in the area. That

year five ranches, encompassing almost 354,000 acres, were reported in the county; about 15,700 cattle were counted in the area that year. No crops were reported.

The first settlers interested in small-scale ranching or farming were homesteaders who established themselves on properties within a strip of land overlooked in the county's first survey (and consequently not included within the huge ranches). This strip, varying in width from three-fourths of a mile to two miles, extended the entire length of the county's southern border. Jim Jarrott encouraged settlement there between 1901 and 1903. The Yellow House section of the XIT, consisting of 235,858 acres in Hockley County and three adjacent counties, was sold to George W. Littlefield in 1901; in 1912, Littlefield began selling farm acreage. Despite this limited burst of settlement in the county, diversified economic development and more significant population growth were delayed until the 1920s, when the big ranchers began selling lands for agricultural uses. As late as 1920, only 137 people lived in the county and only 3,235 acres was classified as improved. Nevertheless, by this time county residents wanted their own county government. The county was organized in 1921; Hockley City won over Ropesville in the county-seat contest.

The settlement of the county accelerated during the 1920s, encouraged by the construction of two branches of the Santa Fe Railroad in the early 1920s-one crossing east to west, the other crossing the southeast corner of the county. Hockley City was renamed Levelland in 1922. The number of farms in the county grew from 18 in 1920 to 279 in 1925 and 1,344 in 1929. Most of the newcomers grew cotton, and by 1929 about 8,300 acres in the county was planted in that staple. In all, cultivated land in the county totaled almost 175,000 acres by 1929. The county's growing population mirrored this economic expansion: by 1930, the population was 9,298.

The Great Depression of the 1930s produced difficult times in Hockley County, as it did elsewhere. Most of the land previously sold to prospective farmers was repossessed in 1930 and 1931. Nevertheless, the number of farms in the county grew significantly during this period as the cotton boom continued and more land was put into cultivation. By 1939, 1,506 farms had been established in Hockley County. More than 106,000 acres was planted in cotton that year, and almost another 150,000 in sorghum; cultivated land totaled more than 266,000 acres. The economy also received a boost in 1937, when oil was discovered in the county. A total of almost 68,000 barrels of crude was pumped from county lands in 1938. The population of the county increased by almost 25 percent during the 1930s, to reach 12,693 by 1940. The economy grew even more rapidly in the 1940s with the expansion of irrigation and the substantial production of oil at Sundown and other fields. The county pumped more than 14,287,000 barrels of crude in 1944 and more than 20,818,000 in 1948; by 1950, there were 3,000 producing oil wells in Hockley County.

The economy diversified into other activities, including the cotton compress industry, the dairy industry, and machine shops. Transportation improved with the construction of U.S. Highway 385 in the late 1950s. By this time Hockley County was consistently one of the top ten agricultural producing counties in the state. Its agricultural income in 1960 was more than $28 million. By 2004 the agricultural income was over $90 million.

Economic Enterprises

Agriculture, agribusiness, and oil production are the principal industries in Hockley County. Other industries include oil field service, retail trade, and ethanol production. In the 2000s, the county's agricultural economy continues to be focused on cotton production. Cotton sales continue to be the largest source of agricultural revenue in the county. Other important agricultural products include grain sorghum, peanuts, wheat, soybeans, and hay *(5)*. Of the 466,782 acres of agricultural land in production about 34 percent of the county's farmland is irrigated. Cattle and other livestock sales also provide large agricultural revenues for the county. Oil production remains a very important part of the economy in Hockley County. In 1982, Hockley County became the sixth county in Texas to celebrate production of its billionth barrel of oil. Petroleum production directly

employs 18 percent of the county's workforce *(10)*. In 2008 the county was the state's fourth ranked crude oil producer *(7)*.

Natural Resources

Soil is the most important natural resource in Hockley County. The production of crops, livestock, and forage which are sources of livelihood for many people in the county, all depend on the soil. Deposits of gravel, caliche, and sand are used for the construction of roads and building sites. Oil production is mainly concentrated in the western part of Hockley County. Water is another important resource. The Ogallala aquifer provides water for municipal, industrial, and agricultural uses. Wildlife, especially waterfowl, is a valuable resource in Hockley County. Geese, ducks, and sandhill cranes migrate by the thousands to the High Plains during the winter months. Hundreds of playa lakes and several large saline lake basins provide food and nesting areas for several migratory waterfowl species. Deer and antelope are present in some parts of the county where adequate forage and cover are located. Also of importance are rabbits, dove, quail, and pheasant.

Transportation Facilities

U.S. Highway 385 crosses Hockley County from north to south through Whitharral, Levelland and Clauene. U.S. Highway 62 crosses Hockley County from northeast to southwest through Ropesville. U.S. Highway 84 crosses Hockley County from northwest to southwest through Anton. State Highway 114 crosses Hockley County from east to west through Smyer, Opdyke, and Levelland. Farm-to-Market Road 41, 168, 300, 301, 303, 597, 1294, 1490, 1585, 2130, 2306, 2646, 3261, and many county roads provide ready access to agricultural markets.

The Burlington Northern and Santa Fe Railroad crosses southeast to northwest following U.S. Highway 84 through Anton and Roundup. The West Texas & Lubbock Railway crosses east to west following State Highway 114 through Smyer, Opdyke, and Levelland and also northeast to southwest following U.S. Highway 62 through Ropesville. The Levelland Municipal Airport provides air service, which is limited to small aircraft.

Climate

Table 1 provides data on temperature and precipitation for the survey area as recorded at Levelland, Texas, in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 40.5 degrees F and the average daily minimum temperature is 25.3 degrees. The lowest temperature on record, which occurred at Levelland on January 13, 1963, is -16 degrees. In summer, the average temperature is 76.8 degrees and the average daily maximum temperature is 91.4 degrees. The highest recorded temperature, which occurred at Levelland on June 28, 1994, was 115 degrees.

Growing degree-days are shown in table 1. They are equivalent to "heat units." During the month, growing degree-days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 19.65 inches at Levelland. Of this, 16.20 inches, or 82 percent, usually falls in April through October. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through October is less than 12.20 inches. The heaviest 1-day rainfall during the period of record was 4.23 inches at Levelland on June 12, 1999. Thunderstorms occur on about 47 days each year, and most occur between May and August.

The average seasonal snowfall is about 9.5 inches. The greatest snow depth at any one time during the period of record was 11 inches recorded on March 16, 1969. On the average, 5 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year. The heaviest 1-day snowfall on record was 10.0 inches recorded on January 21, 1883.

The average relative humidity in mid-afternoon is about 40 percent. Humidity is higher at night, and the average at dawn is about 74 percent. The sun shines 77 percent of the time possible in summer and 66 percent in winter. The prevailing wind is from the south or southwest. Average wind speed is highest, between 14 and 15 miles per hour, between March and May *(6)*.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in

different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineation's of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

Careful study of the original soil survey of Hockley County was made along with many field observations, before major fieldwork for this soil survey began. From these field observations soil scientists were able to determine where map units in the original survey would remain unchanged, which map units should be eliminated, and which new map units should be added to the update of the Hockley County Soil Survey. Soil scientists studied U.S. Geological Survey topographic maps and aerial photographs, relating land and image features. Then the soil scientists made preliminary boundaries of slopes and landforms by stereoscopically plotting the boundaries on aerial photographs.

The soil scientists made traverses by truck on the existing network of roads and trails. Where there were no roads or trails, traverses were made on foot. Soil examinations along the traverses were made every 50 to 1,000 yards, depending on the landscape and soil pattern. The soil was examined with the aid of a hand auger, spade, or power probe to a depth of 5 to 7 feet. Many typical pedons were observed and studied in small pits that were dug by hand. Observations of landforms, surface geology, vegetation, road-cuts, excavations, and animal burrows were made continuously without regard to spacing. Soil boundaries were determined based on soil examinations and photo interpretation.

The soil scientists transected some of the map units to determine their composition and recorded the vegetation. They chose at least three delineations of each transected map unit to be representative of the unit. At least 10 observations 50 to 100 feet apart were made for most transects.

After completion of the field mapping, map unit delineations were transferred by hand to high-altitude aerial photographs at a scale of 1:24,000. Surface drainage and cultural features were transferred from 7½-minute U.S. Geological Survey topographic maps and were recorded from visual observations in the field.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Amarillo fine sandy loam, 1 to 3 percent slopes, is a phase of the Amarillo series. Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Berda-Potter complex, 3 to 12 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Patricia and Amarillo loamy fine sands, 0 to 3 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Water, intermittent, salt lake, is an example.

Table 4 lists the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The “Glossary” defines many of the terms used in describing the soils or miscellaneous areas.

Additional information specific to the components of a map unit is available in the Tables section. A complete soil description with range in characteristics is at the following address: http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi. Information about managing a map unit is available in the section on "Soil Properties" and the section on "Use and Management" which includes subsections on "Crops and Pasture," "Engineering," "Rangeland," "Recreation," and "Wildlife Habitat.

AcA—Acuff loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Acuff and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Acuff soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Acuff are areas that have a soil that is slightly effervescent in all of the upper horizons. Also included in mapping are Acuff soils that have a very fine sandy loam surface texture or slopes of 1 to 3 percent.

The contrasting soils are small areas that have a calcic or petrocalcic horizon less than 40 inches deep or soils that are calcareous throughout and do not have argillic horizons.

Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Acuff

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 12 inches; brown, neutral loam

Bt—12 to 41 inches; reddish brown, moderately alkaline sandy clay loam

Btkk—41 to 58 inches; pink, moderately alkaline sandy clay loam; about 55 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Btk—58 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 20 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent

Percent of area covered by surface fragments: Unspecified

Depth to first restrictive layer: Not present

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer

Salinity, representative within 40 inches: Not saline

Salinity, maximum within 40 inches: Not saline

Sodicity, representative within 40 inches: Not sodic

Sodicity, maximum within 40 inches: Not sodic

Representative total available water capacity to 60 inches: About 8.6 inches (Moderate)

Natural drainage class: Well drained

Runoff: Negligible

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e

Land capability irrigated: 2e

Ecological site name: Deep Hardland 16-21" Pz

Ecological site number: R077CY022TX

Typical vegetation: The natural plant community for this site is short grass dominant with a few midgrasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.

Use and Management

Major land uses: Acuff soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.

Cropland: This soil is well suited to cropland. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants are dominantly shortgrasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is well suited to most urban uses. It is very limited as a site for construction of roads and streets or use as road-fill material. The low soil strength is a major limitation. Stabilizing, strengthening, or replacing the base material can overcome these restrictions.

Recreational Development: This soil is well suited to recreational uses. Dustiness is somewhat limiting. Recreational areas may require water or special surfacing material during dry periods to prevent excessive dustiness due to heavy foot traffic.

Wildlife Habitat: The moderately arid conditions, which can limit plant growth necessary for a good habitat, are a minor limitation.

AcB—Acuff loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Acuff and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Acuff soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Acuff are areas that have a soil that is slightly effervescent in all of the upper horizons. Also included in mapping are Acuff soils that have a very fine sandy loam surface texture or slopes of 3 to 5 percent.

The contrasting soils are small areas that have a calcic or petrocalcic horizon less than 40 inches deep or soils that are calcareous throughout and do not have argillic horizons.

Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Acuff

Aspect(s): Northwest
Position(s) on landform(s): Plain; Playa slope
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 11 inches; brown, neutral loam
Bt—11 to 41 inches; reddish brown, moderately alkaline sandy clay loam

Btkk—41 to 58 inches; pink, moderately alkaline sandy clay loam; about 55 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Btk—58 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 20 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.6 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Deep Hardland 16-21" Pz
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few midgrasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.

Use and Management

Major land uses: Acuff soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.

Cropland: This soil is well suited to cropland. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants are dominantly shortgrasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual

grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is well suited to most urban uses. It is very limited as a site for construction of roads and streets or use as road-fill material. The low soil strength is a major limitation. Stabilizing, strengthening, or replacing the base material can overcome these restrictions.

Recreational Development: This soil is well suited to recreational uses. Dustiness is somewhat limiting. Recreational areas may require water or special surfacing material during dry periods to prevent excessive dustiness due to heavy foot traffic.

Wildlife Habitat: Moderately arid conditions can limit plant growth necessary for a good habitat and are a minor limitation.

AfA—Amarillo fine sandy loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Amarillo and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Amarillo soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Amarillo are areas that have a slight clay decrease in the upper 60 inches of the soil. Also included in mapping are Amarillo soils that have a loamy fine sand surface texture or slopes of 1 to 3 percent.

The contrasting soils are small areas that have a calcic or petrocalcic horizon less than 40 inches deep or soils that are calcareous throughout and do not have argillic horizons.

Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Amarillo

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 10 inches; brown, slightly alkaline fine sandy loam

Bt—10 to 41 inches; reddish brown, slightly alkaline sandy clay loam; slightly effervescent

Btkk—41 to 56 inches; pink, moderately alkaline sandy clay loam; about 60 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Btk—56 to 80 inches; yellowish red, moderately alkaline sandy clay loam; about 20 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Sandy Loam 16-21" Pz
Ecological site number: R077CY036TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: Amarillo soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield high amounts of forage. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses

and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is well suited to urban uses. It is somewhat limited as a site for septic tank absorption fields and sewage lagoons. The seepage and permeability are minor limitations.

Recreational Development: This soil is well suited to recreational uses.

Wildlife Habitat: The moderately arid conditions, which can limit plant growth necessary for a good habitat, are a minor limitation.

AfB—Amarillo fine sandy loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Amarillo and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Amarillo soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Amarillo are areas that have a slight clay decrease in the upper 60 inches of the soil. Also included in mapping are Amarillo soils that have a loamy fine sand surface texture or slopes of 3 to 5 percent.

The contrasting soils are small areas that have a calcic or petrocalcic horizon less than 40 inches deep or soils that are calcareous throughout and do not have argillic horizons.

Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Amarillo

Aspect(s): Northwest
Position(s) on landform(s): Plain; Playa slope
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 9 inches; brown, slightly alkaline fine sandy loam

Bt—9 to 40 inches; reddish brown, slightly alkaline sandy clay loam; slightly effervescent

Btkk—40 to 56 inches; pink, moderately alkaline sandy clay loam; about 60 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Btk—56 to 80 inches; yellowish red, moderately alkaline sandy clay loam; about 20 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Sandy Loam 16-21" Pz
Ecological site number: R077CY036TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: Amarillo soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield high amounts of forage. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is well suited to urban uses. It is somewhat limited as a site for septic tank absorption fields and sewage lagoons. The seepage and permeability are minor limitations.
Recreational Development: This soil is well suited to recreational uses.
Wildlife Habitat: Wind erosion is a potential hazard that can limit growth of grain and seed crops for food and cover. The moderately arid conditions, which can limit plant growth necessary for a good habitat, are a minor limitation.

AfC—Amarillo fine sandy loam, 3 to 5 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Amarillo and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Amarillo soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.
The soils similar to Amarillo are areas that have a slight clay decrease in the upper 60 inches of the soil. Also included in mapping are Amarillo soils that have a loamy fine sand surface texture or slopes of 5 to 8 percent.
The contrasting soils are small areas that have a calcic or petrocalcic horizon less than 40 inches deep or soils that are calcareous throughout and do not have argillic horizons.

Soil Description

Amarillo

Aspect(s): Northwest
Position(s) on landform(s): Plain; Playa slope
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 9 inches; brown, slightly alkaline fine sandy loam
Bt—9 to 40 inches; reddish brown, slightly alkaline sandy clay loam; slightly effervescent
Btkk—40 to 56 inches; pink, moderately alkaline sandy clay loam; about 60 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent
Btk—56 to 80 inches; yellowish red, moderately alkaline sandy clay loam; about 20 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 3 to 5 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.1 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 4e
Ecological site name: Sandy Loam 16-21" Pz
Ecological site number: R077CY036TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: Amarillo soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is well suited to rangeland. Native plants yield high amounts of forage. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is well suited to most urban uses. They are somewhat limited as a site for septic tank absorption fields and sewage lagoons. The slope, seepage, and permeability are minor limitations.
Recreational Development: This soil is well suited to recreational uses.
Wildlife Habitat: This soil has fair potential for use as wildlife habitat. Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

ArA—Arch loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Arch and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Arch soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Arch are areas that have a mollic epipedon and/or mixed mineralogy. Also included in mapping are Arch soils that have a fine sandy loam surface texture or slopes of 1 to 3 percent.

The contrasting soils are small areas that have an argillic or petrocalcic horizon or have fine textured soils that are ponded for brief periods.

Soil Description

Arch

Aspect(s): Northwest
Position(s) on landform(s): Interdune; Playa step
Parent material: Calcareous, loamy eolian and lacustrine deposits of Quaternary age

Typical Profile

A—0 to 6 inches; brown, moderately alkaline loam; violently effervescent

Bk—6 to 16 inches; pale brown, moderately alkaline sandy clay loam; about 18 percent calcium carbonate by volume in the form of masses and finely disseminated carbonates, violently effervescent

Bkk1—16 to 37 inches; very pale brown, moderately alkaline sandy clay loam; about 55 percent calcium carbonate by volume in the form of masses and finely disseminated carbonates, violently effervescent

Bkk2—37 to 80 inches; very pale brown, strongly alkaline sandy clay loam; about 50 percent calcium carbonate by volume in the form of masses and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: About 1 percent subrounded medium and coarse gravel
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic

Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: High Lime 16-21" Pz
Ecological site number: R077CY026TX
Typical vegetation: This is a mid and tall grass site with a lesser short grass compliment and a few woody plants. Forbs also occur but are not abundant. Grasses that are tolerant of the limey conditions dominate the site. Sideoats grama, blue grama, vine mesquite, western wheatgrass, and alkali sacaton are the more common species. Fourwing saltbush will often be present and a few cholla plants may also occur on parts of the site.

Use and Management

Major land uses: Arch soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.
Cropland: This soil is moderately suited to cropland. The low natural fertility, moderate available water holding capacity, and the high calcium carbonate content of the soil are limitations for healthy plant growth. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield low to moderate amounts of forage. The high calcium carbonate content, moderate available water holding capacity, and low natural fertility of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for lawns and landscaping and use as daily cover for landfills. The high carbonate content, moderate available water capacity, and low natural fertility of the soil are major limitations. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The high calcium carbonate content, moderate available water capacity, and low natural fertility of the soil are major limitations.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid and droughty conditions which can limit plant growth necessary for a good habitat is a limitation.

AvA—Arvana fine sandy loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Arvana and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Arvana soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Arvana are areas that have a petrocalcic horizon slightly less than 20 inches deep. Also included in mapping are Arvana soils that have a loamy fine sand surface texture or slopes of 1 to 3 percent.

The contrasting soils are small areas that do not have a petrocalcic horizon.

Soil Description

Arvana

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 11 inches; brown, moderately alkaline fine sandy loam

Bt—11 to 26 inches; reddish brown, moderately alkaline sandy clay loam

Bkkm—26 to 37 inches; 60 percent pink and 40 percent white, cemented material indurated layer containing a few fractures; laminar in the upper part with pisolitic structure below the laminae, becomes softer below the pisolitic layer; violently effervescent

Bkk—37 to 80 inches; pink, moderately alkaline very gravelly loam; about 65 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Less than 1 percent angular channers, about 0 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: 20 to 40 inches (Petrocalcic)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)

Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 4.0 inches (Low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Sandy Loam 16-21" Pz
Ecological site number: R077CY036TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.

Cropland: This soil is moderately suited to cropland. The low available water capacity and depth to a cemented pan are major limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants yield moderate amounts of forage. The depth to a cemented pan and low available water capacity are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for sanitary facilities or lawns and landscaping. The depth to a cemented pan, carbonate content, and low available water capacity of the soil are major limitations.

Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The depth to a cemented pan, low available water capacity, and carbonate content of the soil are major limitations. Other recreational uses are somewhat limited because of depth to a cemented pan.

Wildlife Habitat: Wind erosion is a potential hazard that can limit growth of grain and seed crops for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

AvB—Arvana fine sandy loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Arvana and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Arvana soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Arvana are areas that have a petrocalcic horizon slightly less than 20 inches deep. Also included in mapping are Arvana soils that have a loamy fine sand surface texture or slopes of 3 to 5 percent.

The contrasting soils are small areas that do not have a petrocalcic horizon.

Soil Description

Arvana

Aspect(s): Northwest
Position(s) on landform(s): Plain; Playa slope
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 9 inches; brown, moderately alkaline fine sandy loam

Bt—9 to 26 inches; strong brown, moderately alkaline sandy clay loam

Bkkm—26 to 37 inches; 60 percent pink and 40 percent white, indurated layer containing a few fractures, laminar in the upper part with pisolitic structure below the laminae and becomes softer below the pisolitic layer; violently effervescent

Bkk—37 to 80 inches; pink, moderately alkaline very gravelly loam; about 65 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: Less than 1 percent angular channers, about 0 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: 20 to 40 inches (Petrocalcic)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, representative within 40 inches: Not saline

Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 4.0 inches (Low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Sandy Loam 16-21" Pz
Ecological site number: R077CY036TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The low available water capacity, depth to a cemented pan, and medium runoff are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The depth to a cemented pan and low available water capacity are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for sanitary facilities or lawns and landscaping. The depth to a cemented pan, carbonate content, and low available water capacity of the soil are major limitations.
Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The depth to a cemented pan, low available water capacity, and carbonate content of the soil are major limitations. Other recreational uses are somewhat limited because of depth to a cemented pan.

Wildlife Habitat: Wind erosion is a potential hazard that can limit growth of grain and seed crops for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

BcA—Bippus clay loam, 0 to 2 percent slopes, occasionally flooded

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Bippus and similar soils: 80 percent
Contrasting soils: 20 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Bippus soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The similar soils are areas of Bippus that have a mollic epipedon less than 20 inches thick or soils that have a calcic horizon below 40 inches. Also included in mapping are small areas of Bippus soils that have a loam surface texture or slopes up to 3 percent.

The contrasting soils are small areas where soils have less than 18 percent clay in the particle-size control section or soils that are highly calcareous in all horizons and have a calcic horizon less than 40 inches deep.

Soil Description

Bippus

Aspect(s): Northwest
Position(s) on landform(s): Ephemeral stream on draw
Parent material: Loamy alluvium of Holocene age

Typical Profile

Ap—0 to 14 inches; brown, moderately alkaline clay loam

Bw—14 to 65 inches; brown, moderately alkaline sandy clay loam

Bk—65 to 80 inches; light yellowish brown, moderately alkaline fine sandy loam; about 10 percent calcium carbonate by volume in the form of filaments, masses, and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 2 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 10.5 inches (High)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Occasional
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: 2w
Ecological site name: Draw 16-24" Pz
Ecological site number: R077EY052TX
Typical vegetation: The natural plant community is dominantly midgrasses with lesser amounts of both tall and shortgrass species. A few forbs occur along with a few woody plants. The dominant species are western wheatgrass, vine mesquite, and sideoats grama. Blue grama and buffalograss make up most of the shortgrass compliment.

Use and Management

Major land uses: Bippus soils are used primarily as rangeland and habitat for wildlife. A few small areas are used as improved pasture or cropland.
Cropland: While not extensively used for cropland this soil is well suited. Most areas are so narrow that use as cropland is limited and occasional flooding is a hazard. The most common crops grown on this soil are grain sorghum, wheat, and cotton. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: These soils are well suited to rangeland. Native plants yield high amounts of forage. Occasional flooding is a minor limitation. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: These soils are poorly suited to urban uses. They are very limited as a site for sanitary facilities and building site development. The low soil strength and occasional flooding are major limitations. Overcoming these limitations is difficult and costly.
Recreational Development: These soils are moderately suited to most recreational uses. They are very limited as a site for camp areas unless protected from the hazard of flooding. The season, duration, and frequency of flooding should be considered in planning playgrounds and other recreational areas.
Wildlife Habitat: These soils have good potential for use as wildlife habitat. Occasional flooding is a minor limitation.

BeC—Berda loam, 3 to 5 percent slopes

Setting

General location: Southern High Plains Breaks of western Texas and eastern New Mexico.
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 3,745 feet (670 to 1143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Berda and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Berda soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The similar soils are areas of Berda that have a mollic epipedon or have a calcic horizon less than 40 inches deep. Also included in mapping are small areas of Berda soils that have a very fine sandy loam surface texture or slopes 5 to 8 percent.

The contrasting soils are small areas where soils have a coarse-loamy or loamy-skeletal particle-size class or soils that have carbonatic mineralogy.

Soil Description

Berda

Aspect(s): Northwest
Position(s) on landform(s): Backslope on escarpment; backslope on valley side
Parent material: Calcareous, loamy colluvium and slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 7 inches; light brown, moderately alkaline loam; violently effervescent

Bw—7 to 22 inches; light brown, moderately alkaline loam; few fine filaments of calcium carbonate in pore linings; violently effervescent

Bk1—22 to 52 inches; light reddish brown, moderately alkaline clay loam; about 4 percent calcium carbonate by volume in the form of filaments and nodules; violently effervescent

Bk2—52 to 80 inches; light reddish brown, moderately alkaline sandy clay loam; about 5 percent calcium carbonate by volume in the form of filaments and nodules; violently effervescent

Properties and Qualities

Slope: 3 to 5 percent
Percent of area covered by surface fragments: About 2 percent subangular (shape or size unspecified), about 1 percent subrounded medium and coarse gravel
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline

Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 4e
Ecological site name: Hardland Slopes 16-24" Pz
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by shortgrass with a significant midgrass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other midgrasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The slope, runoff, and moderate available water capacity of the soil are major limitations. The hazard of erosion is severe.
Rangeland: These soils are moderately suited to rangeland. Native plants are dominantly short and midgrasses, which produce moderate amounts of forage. Moderate runoff and available water capacity are limitations. The hazard of erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: These soils are well suited for most urban uses. They are somewhat limited as a site for the construction of small commercial buildings, local roads and streets, sewage lagoons, or use as road-fill material. The slope and low soil strength are minor limitations.
Recreational Development: This soil is well suited to most recreational uses. Dustiness is somewhat limiting. Recreational areas may require water or special surfacing material during dry periods to prevent excessive dustiness due to heavy foot traffic.
Wildlife Habitat: These soils have fair potential for use as wildlife habitat. Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat is a minor limitation.

BP—Borrow pits

Setting

General location: Southern High Plains of western Texas, Oklahoma, and eastern New Mexico
Major land resource area: 77C,77E—Southern High Plains, Southern Part; Southern High Plains, Breaks
Elevation: 2,195 to 3,745 feet (670 to 1143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Pits borrow and similar soils: 95 percent
Contrasting soils: 5 percent

Based on field observations of the map unit during the survey, the best estimate is that the Borrow Pits make up 95 percent of the map unit, and other soils make up 5 percent.

Other soils include mine spoil or small areas where soils remained intact and unmined.

Soil Description

Pits Borrow

Aspect(s): Northwest
Position(s) on landform(s): Borrow pit
Parent material: Caliche mine spoil or earthy fill

Properties and Qualities

Slope: 0 to 45 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 2.4 inches (Very low)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 8s
Land capability irrigated: None specified
Ecological site name: Not specified
Ecological site number: Not specified
Typical vegetation: Not specified

Use and Management

Major land uses: This map unit consists of caliche and gravel pits that have been excavated for use mainly as road material. Borrow pits have steep vertical sidewalls, are 10 to 15 feet deep, and range from 5 to 50 acres in size. The exposed soil material in the pits is mainly caliche, gravel, and calcareous soil material.

Cropland: These areas are poorly suited to cropland. The slope, droughtiness, very low available water capacity, high carbonate content, very high runoff, and low natural fertility are major limitations. The hazard of erosion is severe.

Rangeland: These areas are poorly suited to rangeland. The steep slope, very high rate of runoff, low available water capacity, high carbonate content, low natural fertility, and ponding are major limitations. The hazard of erosion is severe.

Urban Development: These areas are poorly suited to urban uses. They are very limited for use as sanitary facilities and building site development. The slope, ponding,

restricted permeability, droughtiness, gravel, and carbonate content are major limitations.

Recreational Development: These areas are poorly suited to recreational uses. They are very limited because of the slope, droughtiness, gravel content, carbonate content, and hazard of ponding are major limitations.

Wildlife Habitat: These areas have poor potential for use as wildlife habitat. The low available water capacity, surface rock fragments, arid conditions, and ponding are major limitations which restrict plant growth necessary for good habitat. Occasionally these areas used by transient wildlife that use water here following rainy periods or for cover; however, since there is little or no vegetation, this use is very limited. These areas are severely limited for other uses.

BpD—Berda-Potter complex, 3 to 12 percent slopes

Setting

General location: Southern High Plains Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,195 to 4,700 feet (670 to 1433 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Berda and similar soils: 55 percent
Potter and similar soils: 30 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Berda and similar soils make up 55 percent of the map unit, the Potter and similar soils make up 30 percent of the map unit, and the contrasting soils make up 15 percent.

The soils similar to Berda are areas that have a mollic epipedon or have a calcic horizon less than 40 inches deep. Also included in mapping are small areas of Berda soils that have a very fine sandy loam surface texture.

The soils similar to Potter are gravelly soils with slightly less than 35 percent rock fragments by volume in the particle-size control section.

The contrasting soils are small areas where soils have an argillic horizon, coarse loamy particle-size class, or soils that have petrocalcic horizons or paralithic contact.

Also included in mapping are borrow pits less than 3 acres in size, U-shaped gullies, rock outcropping, or slopes of 12 to 20 percent.

Soil Description

Berda

Aspect(s): Northwest
Position(s) on landform(s): Backslope on escarpment; backslope on valley side
Parent material: Calcareous, loamy colluvium and slope alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 6 inches; light brown, moderately alkaline loam; violently effervescent

Bw—6 to 20 inches; light brown, moderately alkaline loam; few fine filaments of calcium carbonate in pore linings; violently effervescent

Bk1—20 to 52 inches; light reddish brown, moderately alkaline clay loam; about 4 percent calcium carbonate by volume in the form of filaments and nodules; violently effervescent

Bk2—52 to 80 inches; light reddish brown, moderately alkaline sandy clay loam; about 5 percent calcium carbonate by volume in the form of filaments and nodules; violently effervescent

Properties and Qualities

Slope: 3 to 12 percent
Percent of area covered by surface fragments: About 2 percent subangular (shape or size unspecified), about 1 percent subrounded medium and coarse gravel
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Hardland Slopes 16-24" Pz
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by shortgrass with a significant midgrass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other midgrasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.

Potter

Aspect(s): Northwest
Position(s) on landform(s): Shoulder on draw; shoulder on escarpment
Parent material: Calcareous, loamy alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 6 inches; grayish brown, moderately alkaline gravelly loam; about 16 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; strongly effervescent

Bk—6 to 15 inches; light brownish gray and light gray, moderately alkaline very gravelly fine sandy loam; about 38 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; many medium and coarse masses of calcium carbonate; violently effervescent

BCkk1—15 to 29 inches; white, strongly alkaline very gravelly fine sandy loam; about 53 percent by volume of very strongly cemented, thin platy calcrete fragments and

nodules, 2.5 to 8 cm on the long axis, plates are fractured and undersides have about 2.5 to 6 mm long pendants of calcium carbonate; 32 percent of the volume is carbonate masses and loamy soil material; violently effervescent

BCkk2—29 to 80 inches; white, strongly alkaline extremely gravelly fine sandy loam; about 61 percent by volume of very strongly cemented, thick platy calcrete fragments and nodules, 2.5 to 15 cm on the long axis, plates are fractured; 26 percent of the volume is carbonate masses and loamy soil material; violently effervescent

Properties and Qualities

Slope: 3 to 12 percent
Percent of area covered by surface fragments: About 30 percent subangular (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.9 inches (Low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Very Shallow 16-24" Pz
Ecological site number: R077EY068TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat.
Cropland: These soils are poorly suited to cropland. The carbonate content, very high runoff, and droughtiness of Potter soils, and the slope of both soils are major limitations. The hazard of erosion is severe.
Rangeland: Berda soils are moderately suited to rangeland. Native plants are dominantly short and midgrasses, which produce moderate amounts of forage. The slope, moderate runoff, and moderate available water capacity are limitations. The Potter soils are poorly suited to rangeland. Native plants yield low amounts of forage. The high carbonate content of the soil, very low available water capacity, slope, and very high rate of runoff are major limitations. The hazard of erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking

rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: Berda soils are moderately suited to most urban uses. They are very limited as a site for small commercial buildings or sewage lagoons. The slope is a major limitation. Potter soils are poorly suited to most urban uses. They are very limited as a site for small commercial buildings, sewage lagoons, lawns and landscaping, or use as daily cover for landfills. The slope, high carbonate content, high gravel content, and droughtiness of the soil are major limitations. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational Development: These soils are moderately suited to most recreational uses. Berda soils are very limited for use as playgrounds. The slope is a major limitation. The Potter soil is very limited for use as playgrounds and golf fairways. The slope, droughtiness, high carbonate content, and high gravel content of the soil is a major limitation. Both soils are somewhat limited because of dustiness. Recreational areas may require water or special surfacing material during dry periods to prevent excessive dustiness due to heavy foot traffic.

Wildlife Habitat: These soils have poor potential for use as wildlife habitat. Arid conditions and low available water capacity are major limitations which restrict plant growth necessary for good habitat. The potential for wind and water erosion is severe.

ChA—Chapel clay, 0 to 1 percent slopes, occasionally ponded

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,300 feet (823 to 1311 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Chapel and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Chapel soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Chapel are areas that are wet for longer periods of time or soils that have a calcic horizon between 40 and 80 inches.

The contrasting soils are small areas that are on slightly higher landscape positions and are not ponded or soils that have less than 35 percent clay in the particle-size control section.

Soil Description

Chapel

Aspect(s): Northwest
Position(s) on landform(s): Circular gilgai on playa floor
Parent material: Calcareous, clayey lacustrine deposits of Quaternary age

Typical Profile

A—0 to 5 inches; dark grayish brown, slightly alkaline clay; few iron-manganese concretions; slightly effervescent
Bw—5 to 14 inches; dark gray, slightly alkaline clay; few iron-manganese concretions; slightly effervescent
Bkss—14 to 35 inches; gray, moderately alkaline clay; about 4 percent calcium carbonate nodules by volume; strongly effervescent
2Bk—35 to 80 inches; white, strongly alkaline clay loam; about 40 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.4 inches (Moderate)
Natural drainage class: Somewhat poorly drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4w
Land capability irrigated: None specified
Ecological site name: Playa 16-21" Pz
Ecological site number: R077CY027TX
Typical vegetation: The natural plant community of a playa is highly variable and dependent on the hydrology of the playa basin being considered. The dominance of hydrophytic plants or upland plants depends on the degree, frequency, and time of inundation. Vegetation varies according to the amount of water available during the growing season. On average years, the dominant plant community for this site is a mixture of upland grasses and forbs with highly variable amounts of hydrophytic plants present. Very few shrubs or woody plants occur on this site. The most common plants are western wheatgrass, vine mesquite, barnyard grass, buffalograss, bur ragweed, saltmarsh aster, sedges, coreopsis, lambs quarters, cocklebur, curly dock, Pennsylvania smartweed, and common spikerush.

Use and Management

Major land uses: Chapel soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland.
Cropland: This soil is moderately suited to cropland. The clayey texture of the soil, which can restrict root development, and occasional ponding are limitations. The most common crops grown are cotton and grain sorghum. Other crops include wheat and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover

crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: High yields of forage can be obtained during favorable years. Occasional ponding and the high clay content of the soil are limitations that can restrict plant growth. Other concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. Occasional ponding, high clay content, restricted permeability, high shrink-swell potential, and low strength are major limitations. Overcoming many of these limitations is difficult and costly. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational Development: This soil is poorly suited to recreational uses. The high clay content of the soil and occasional ponding is very limiting.

Wildlife Habitat: The clayey surface texture is a major limitation that limits plant growth necessary for good habitat. Occasional ponding is a minor limitation. Waterfowl, such as ducks and geese, make limited use of this habitat for food and cover.

CtC—Creta very fine sandy loam, 1 to 5 percent slopes

Setting

General location: Southern High Plains Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,595 to 4,100 feet (792 to 1250 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Creta and similar soils: 90 percent
Contrasting soils: 10 percent

Composition is based on observations, descriptions, and or transects of the map unit

Soil Description

Creta

Aspect(s): Northwest
Position(s) on landform(s): Footslope on escarpment; backslope on valley side
Parent material: Calcareous, loamy colluvium from the Ogallala Formation of Miocene-Pliocene age over residuum weathered from limestone, sandstone, and shale of Cretaceous age

Typical Profile

A—0 to 8 inches; dark grayish brown, moderately alkaline very fine sandy loam; violently effervescent

Bt—8 to 27 inches; brown, moderately alkaline sandy clay loam few fine and medium nodules of calcium carbonate; violently effervescent

Btkn—27 to 44 inches; grayish brown, moderately alkaline sandy clay loam; about 8 percent calcium carbonate by volume as masses and nodules; moderately sodic; slightly saline; violently effervescent

2Btny—44 to 70 inches; grayish brown, moderately alkaline clay; about 8 percent by volume gypsum and salt crystals; moderately sodic; moderately saline; violently effervescent

2Cr—70 to 80 inches; pale olive and yellow interbedded soft siltstone and shale bedrock; about 10 percent by volume gypsum and salt crystals; moderately sodic; moderately saline; violently effervescent

Properties and Qualities

Slope: 1 to 5 percent
Percent of area covered by surface fragments: About 2 percent (shape or size unspecified),
Depth to first restrictive layer: 27 inches (Natric)
Paralithic bedrock: 70 inches
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 4.2 inches (Low)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: None specified
Ecological site name: Hardland Slopes 16-24" Pz
Ecological site number: R077EY055TX
Typical vegetation: This is a transitional site dominated by shortgrass with a significant midgrass component. Blue grama is the dominant grass species. Buffalograss and sideoats grama are next in importance. Other midgrasses are vine mesquite and western wheatgrass. Yucca is the principal woody plant with relatively few forbs present.

Use and Management

Major land uses: These soils are primarily used for rangeland but some areas are cultivated to grain sorghum and cotton.

DRC—Drake soils, 1 to 8 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Drake and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Drake soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Drake are areas that have slightly higher concentrations of calcium carbonate throughout the soil horizons. Also included in mapping are Drake soils that have slopes of 8 to 12 percent.

The contrasting soils are small areas that have carbonatic soil mineralogy or have a sodic horizon.

Soil Description

Drake

Aspect(s): Northwest
Position(s) on landform(s): Playa dune
Parent material: Calcareous, loamy eolian deposits of Quaternary age

Typical Profile

A—0 to 15 inches; pale brown, moderately alkaline loam; strongly effervescent

Bk1—15 to 28 inches; light brownish gray, moderately alkaline sandy clay loam; about 3 percent calcium carbonate by volume as filaments and nodules; violently effervescent

Bk2—28 to 69 inches; light brownish gray, moderately alkaline loam; about 3 percent calcium carbonate by volume as filaments and nodules; violently effervescent

Bk3—69 to 80 inches; light yellowish brown, moderately alkaline fine sandy loam; about 3 percent calcium carbonate by volume as filaments and nodules; violently effervescent

Properties and Qualities

Slope: 1 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 7.7 inches (Moderate)
Natural drainage class: Well drained

Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: High Lime 16-21" Pz
Ecological site number: R077CY026TX
Typical vegetation: This is a mid and tall grass site with a lesser short grass compliment and a few woody plants. Forbs also occur but are not abundant. Grasses that are tolerant of the limey conditions dominate the site. Sideoats grama, blue grama, vine mesquite, western wheatgrass, and alkali sacaton are the more common species. Fourwing saltbush will often be present and a few cholla plants may also occur on parts of the site.

Use and Management

Major land uses: Drake soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.
Cropland: This soil is poorly suited to cropland. The moderate available water capacity, droughtiness, runoff, carbonate content, and low natural fertility of the soil are major limitations. The hazard of wind erosion is severe. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The medium runoff, moderate available water capacity, carbonate content, and low natural fertility of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. The carbonate content, moderate available water holding capacity, runoff, and low natural fertility of the soil limit plant growth necessary for healthy lawns and landscaping is a limitation. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is moderately suited to most recreational uses. It is somewhat limited for use as camping areas, playgrounds, picnic areas, or paths and trails. The slope and dustiness are minor limitations. Applications of water or special surfacing material may be needed during dry periods to prevent excessive dustiness in areas that are subject to heavy foot traffic.
Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions which can limit plant growth necessary for good habitat are a minor limitation.

DRE—Drake soils, 8 to 20 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau

Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Drake and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Drake soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Drake are areas that have slightly higher concentrations of calcium carbonate throughout the soil horizons. Also included in mapping are Drake soils that have slopes of 20 to 30 percent.

The contrasting soils are small areas that have carbonatic soil mineralogy or have a sodic horizon.

Soil Description

Drake

Aspect(s): Northwest
Position(s) on landform(s): Playa dune
Parent material: Calcareous, loamy eolian deposits of Quaternary age

Typical Profile

A—0 to 14 inches; pale brown, moderately alkaline loam; strongly effervescent

Bk1—14 to 28 inches; light brownish gray, moderately alkaline sandy clay loam; about 3 percent calcium carbonate by volume as filaments and nodules; violently effervescent

Bk2—28 to 69 inches; light brownish gray, moderately alkaline loam; about 3 percent calcium carbonate by volume as filaments and nodules; violently effervescent

Bk3—69 to 80 inches; light yellowish brown, moderately alkaline fine sandy loam; about 3 percent calcium carbonate by volume as filaments and nodules; violently effervescent

Properties and Qualities

Slope: 8 to 20 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 7.7 inches (Moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: High Lime 16-21" Pz
Ecological site number: R077CY026TX
Typical vegetation: This is a mid and tall grass site with a lesser short grass compliment and a few woody plants. Forbs also occur but are not abundant. Grasses that are tolerant of the limey conditions dominate the site. Sideoats grama, blue grama, vine mesquite, western wheatgrass, and alkali sacaton are the more common species. Fourwing saltbush will often be present and a few cholla plants may also occur on parts of the site.

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat.
Cropland: This soil is poorly suited to cropland. The moderate available water holding capacity, slope, runoff, carbonate content, droughtiness, and low natural fertility of the soil are major limitations. The hazard of wind erosion is severe.
Rangeland: Native plants yield moderate amounts of forage. The runoff, moderate available water holding capacity, carbonate content, and low natural fertility of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is poorly suited to most urban uses. It is very limited as a site for small commercial buildings and sewage lagoons. The slope is a major limitation. Moderate available water holding capacity, runoff, carbonate content, and low natural fertility of the soil limits plant growth necessary for healthy lawns and landscaping and is a limitation. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for playgrounds. The slope is a major limitation. It is somewhat limited for use as camping areas, picnic areas, or paths and trails. The slope and dustiness are minor limitations. Applications of water or special surfacing material may be needed during dry periods to prevent excessive dustiness in areas that are subject to heavy foot traffic. The moderate available water capacity, medium runoff, carbonate content, and low natural fertility of the soil can limit plant growth necessary for healthy golf fairways and landscaping.
Wildlife Habitat: Erosion is a potential hazard for grain and seed crops and domestic grasses and legumes used for food and cover. The moderately arid conditions which can limit plant growth necessary for good habitat is a minor limitation.

EsA—Estacado loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)

Frost-free period: 185 to 220 days

Composition

Estacado and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Estacado soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Estacado are small areas that are not calcareous in the surface horizon or soils that have a calcic horizon above 24 inches. Also included in mapping are small areas of Estacado soils that have a surface layer of fine sandy loam or have slopes of 1 to 3 percent.

The contrasting soils include small areas where soils do not have an argillic horizon or soils that have a petrocalcic horizon. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Estacado

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 6 inches; dark grayish brown, moderately alkaline loam; slightly effervescent

Bt—6 to 38 inches; brown, moderately alkaline sandy clay loam; few fine nodules of calcium carbonate; strongly effervescent

Btk—38 to 50 inches; reddish yellow, moderately alkaline sandy clay loam; about 40 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Btkk—50 to 80 inches; pinkish white, moderately alkaline clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: About 0 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.3 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Deep Hardland 16-21" Pz
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few midgrasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly shortgrasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is well suited to most urban uses. It is very limited as a site for construction of roads and streets or use as road-fill material. The low soil strength is a major limitation. Stabilizing, strengthening, or replacing the base material can overcome these restrictions.
Recreational Development: This soil is well suited to recreational uses. Dustiness is somewhat limiting. Recreational areas may require water or special surfacing material during dry periods to prevent excessive dustiness due to heavy foot traffic.
Wildlife Habitat: The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

FrA—Friona loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 3,395 to 4,595 feet (1036 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Friona and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Friona soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Friona are areas that have a petrocalcic horizon slightly less than 20 inches deep or soils without a mollic epipedon. Also included in mapping are Friona soils that have a very fine sandy loam surface texture or slopes of 1 to 3 percent.

The contrasting soils are small areas that do not have a petrocalcic horizon.

Soil Description

Friona

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 8 inches; brown, slightly alkaline loam
Bt—8 to 31 inches; yellowish red, moderately alkaline sandy clay loam
Bkkm—31 to 35 inches; pinkish white, indurated platy caliche, strongly cemented in the lower part; the upper surface is laminar and smooth; violently effervescent
Btk—35 to 80 inches; pinkish white, moderately alkaline sandy clay loam; about 50 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: 20 to 35 inches (Petrocalcic)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 4.8 inches (Low)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Deep Hardland 16-21" Pz
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few midgrasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.

KmB—Kimberson gravelly loam, 0 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Kimberson and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Kimberson soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Kimberson are areas that have a fractured petrocalcic horizon or similar soils without a mollic epipedon. Also included in mapping are Kimberson soils that have a fine sandy loam surface texture or slopes of 3 to 5 percent.

The contrasting soils are small areas that do not have a petrocalcic horizon.

Soil Description

Kimberson

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age over indurated caliche of Pliocene age

Typical Profile

A—0 to 11 inches; dark grayish brown, moderately alkaline gravelly loam; 15 percent gravel and cobble size petrocalcic fragments; strongly effervescent

Bkkm—11 to 28 inches; white, indurated platy caliche containing a few fractures; laminar in the upper part; thin to thick, concentrically-banded pisolitic structure below the laminar layer; violently effervescent

Bkk—28 to 64 inches; white and light gray, moderately alkaline extremely gravelly fine sandy loam; 40 percent gravel-sized and 45 percent cobble-sized caliche fragments; violently effervescent

B'kkm—64 to 80 inches; white, cemented material indurated platy caliche containing a few fractures; laminar in the upper part; violently effervescent

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: About 5 percent subrounded (shape or size unspecified), about 4 percent angular channers
Depth to first restrictive layer: 4 to 20 inches (Petrocalcic)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)

Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.8 inches (Very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Very Shallow 16-21" Pz
Ecological site number: R077CY037TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.
Cropland: This soil is poorly suited to cropland. The shallow rooting depth, very low available water capacity, and droughtiness are major limitations. The hazard of wind erosion is severe. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield low amounts of forage. The depth to a cemented pan, very low available water capacity, and high runoff are major limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. The depth to a cemented pan, carbonate content, and droughtiness are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational Development: This soil is poorly suited to most recreational uses. It is very limited as a site for golf fairways, playgrounds, camping areas, and picnic areas. The depth to a cemented pan, very low available water capacity, droughtiness, gravel content, and carbonate content of the soil are major limitations.
Wildlife Habitat: The low available water capacity and very slow permeability are major limitations that restrict plant growth necessary for good habitat. The potential for wind and water erosion is severe.

LDA—Levelland soils, 0 to 2 percent slopes, occasionally flooded

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,795 to 4,300 feet (853 to 1311 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Levelland and similar soils: 85 percent
Contrasting soils: 15 percent

Composition is based on observations, descriptions, and or transects of the map unit

Soil Description

Levelland

Aspect(s): Northwest
Position(s) on landform(s): Ephemeral stream on draw
Parent material: Recent sandy eolian deposits over loamy alluvium Holocene age

Typical Profile

Ap—0 to 31 inches; light brown, moderately alkaline fine sandy loam
2Ab—31 to 45 inches; dark grayish brown, moderately alkaline fine sandy loam
2Btb—45 to 70 inches; brown, moderately alkaline sandy clay loam
2Bkb—70 to 80 inches; pale brown, moderately alkaline fine sandy loam; about 15 percent calcium carbonate by volume as filaments, masses, and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 2 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: Occasional
Ponding frequency: Not ponded
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 2w
Land capability irrigated: 2w
Ecological site name: Draw 16-21" Pz
Ecological site number: R077CY023TX
Typical vegetation: The natural plant community for this site is mainly tall and mid grasses with a few woody species. The vegetation includes little bluestem, sand bluestem, big bluestems; switchgrass, wildrye, Texas wintergrass, vine-mesquite, meadow dropseed, western wheatgrass, sideoats grama, Engelmann daisy, heath aster, Maximilian sunflower, elm, hackberry, soapberry, cottonwood, and ash.

Use and Management

Major land uses: Dominantly native pasture or range but some areas are cultivated to cotton, grain sorghum, and wheat.

LDF—Landfill

Setting

General location: Southern High Plains of western Texas, Oklahoma, and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape:
Elevation: 2,460 to 4,795 feet (750 to 1463 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Dumps sanitary landfill and similar soils: 100 percent

Composition is based on observations, descriptions, and or transects of the map unit

Soil Description

Dumps Sanitary Landfill

Aspect(s): Northwest
Position(s) on landform(s): Sanitary landfill

Properties and Qualities

Slope: 1 to 20 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 6.0 to 20 in/hr (Rapid)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic

Representative total available water capacity to 60 inches: About (Very low)
Natural drainage class: Moderately well drained
Runoff: Very low
Flooding frequency: None
Ponding frequency: Not ponded
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 8s
Land capability irrigated: None specified
Ecological site name: Not specified
Ecological site number: Not specified
Typical vegetation: Not specified

LeA—Lenorah fine sandy loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Lenorah and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Lenorah soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Lenorah are areas of soils that have a mollic epipedon calcic horizon greater than 60 inches or soils that have linear extensibility of 6 or more in the upper 40 inches of the soil surface. Also included in mapping are Olton soils that have a surface texture of loam or slopes of 1 to 3 percent.

The contrasting soils are small areas where soils have less than 35 percent clay in the particle-size control section or soils calcareous in the upper part and have a calcic horizon less than 30 inches deep. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Lenorah

Aspect(s): Northwest
Position(s) on landform(s): Ancestral drainageway; Valley flat
Parent material: Calcareous, loamy eolian deposits over sandy alluvium of Quaternary age

Typical Profile

Ap—0 to 8 inches; pale brown, moderately alkaline fine sandy loam; strongly effervescent

Bnz—8 to 22 inches; pale brown, strongly alkaline sandy clay loam; few fine masses of calcium carbonate, about 2 percent; few fine distinct black masses of iron manganese; moderately saline; moderately sodic; strongly effervescent

Bknz—22 to 47 inches; light gray, strongly alkaline sandy clay loam; about 30 percent calcium carbonate by volume as masses and nodules; moderately saline; moderately sodic; violently effervescent

2Bnz—47 to 65 inches; very pale brown, moderately alkaline loamy fine sand; many brownish yellow masses of iron accumulation on ped surfaces; few fine masses of calcium carbonate, about 2 percent; slightly saline; moderately sodic; strongly effervescent

2C—65 to 80 inches; light gray, moderately alkaline sand; few fine nodules of calcium carbonate; common very fine to medium fragments of snail shell; slightly saline; moderately sodic; strongly effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: 8 inches (Natric)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 1.0 inches (Very low)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: Very rare
Ponding frequency: Not ponded
Depth to seasonal water table: Present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: 4e
Ecological site name: Wet Saline 16-21" Pz
Ecological site number: R077CY689TX
Typical vegetation: The natural plant community for this site is a mixture of salt tolerant grasses and grasslike plants, forbs, and shrubs. The vegetation on most of the site is a shrub dominant with salt cedar (tamarix) and baccharis being the two most prevalent species. In open areas and in the understory there are varying amounts of alkali sacaton, Texas dropseed, creeping muhly, jointtail, inland saltgrass, sedge and rushes, and occasionally some western wheatgrass. Forbs include kochia, smartweed, dock, and annual forbs. In areas of standing water cattails may be present. In extreme saline areas vegetation is sparse. Occasionally there will be a few willows and cottonwoods present.

Use and Management

Major land uses: Used primarily for rangeland or wildlife but cotton and grain sorghum are grown in some areas.

LoA—Lofton clay loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part

Landscape: Plateau
Elevation: 2,900 to 4,595 feet (884 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Lofton and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Lofton soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Lofton are areas where the similar soil has a calcic horizon below 60 inches or similar soils that do not have argillic horizons.

The contrasting soils are small areas that are ponded for longer periods of time or soils that have less than 35 percent clay in the particle-size control section.

Soil Description

Lofton

Aspect(s): Northwest
Position(s) on landform(s): Depression; Tread on playa step
Parent material: Clayey lacustrine deposits derived from the Blackwater Draw Formation of Pleistocene age

Typical Profile

A—0 to 9 inches; dark gray, slightly alkaline clay loam

Bt—9 to 38 inches; dark grayish brown, slightly alkaline clay

Btk—38 to 52 inches; grayish brown, moderately alkaline clay; about 3 percent visible calcium carbonate in the form of filaments and films; strongly effervescent

Bk—52 to 80 inches; grayish brown, moderately alkaline silty clay; about 25 percent calcium carbonate by volume in the form of filaments, masses, and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.2 inches (High)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2s
Ecological site name: Deep Hardland 16-21" Pz
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few midgrasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.

Use and Management

Major land uses: These soils are primarily used for cropland. Many areas are also used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The clayey texture of the soil, which can restrict root development, and occasional ponding are limitations. The most common crops grown on this soil are cotton and grain sorghum. Other crops include wheat and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is moderately suited to rangeland. Native plants are dominantly shortgrasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is poorly suited to most urban uses. They are very limited for use as sanitary facilities and building site development. The high clay content, restricted permeability, high shrink-swell potential, low strength, and occasional ponding are major limitations. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is poorly suited to recreational uses. They are very limited because of occasional ponding. The season, frequency, and duration of ponding should be considered in planning recreational areas.
Wildlife Habitat: This soil has moderate potential for use as wildlife habitat. The slow percolation of the soil is a major limitation for grain and seed crops and domestic grasses and legumes used for food and cover. The moderately clayey surface texture is a minor limitation which affects plant growth necessary for good habitat.

M-W—Miscellaneous water

A small constructed pond or pit that is used for industrial, sanitary, or mining applications. It contains water most of the year and is typically 5 to 20 acres in size.

MdA—Midessa fine sandy loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Midessa and similar soils: 85 percent
Contrasting soils 15 percent:

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Midessa soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Midessa are small areas of Arch and Lenorah soils on similar landscape positions. Also included are small areas of Midessa soils that have a surface layer of loamy fine sand, or slopes of 1 to 3 percent.

The contrasting soils are small areas of Amarillo, Arvana, Portales, Posey, and Tokio soils that are on similar landscapes.

Soil Description

Midessa

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian and lacustrine deposits of Quaternary age

Typical Profile

A—0 to 10 inches; brown, moderately alkaline fine sandy loam; few fine calcium carbonate nodules; violently effervescent

Bk1—10 to 30 inches; pale brown, moderately alkaline sandy clay loam; about 8 percent calcium carbonate by volume in the form of filaments, nodules, and finely disseminated carbonates; violently effervescent

Bkk—30 to 60 inches; very pale brown, moderately alkaline sandy clay loam; about 52 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

B'k2—60 to 80 inches; light brown, moderately alkaline sandy clay loam; about 35 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: About 1 percent subrounded fine and medium gravel
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline

Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for lawns and landscaping or use as daily cover for landfills. The moderate available water capacity and high carbonate content of the soil are major limitations which can limit plant growth necessary for healthy lawns and landscaping. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and

high carbonate content of the soil are major limitations that can restrict plant growth necessary for healthy landscaping and turf.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

MdB—Midessa fine sandy loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Midessa and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Midessa soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

Soils similar to Midessa are small areas of Arch, Drake, and Lenorah soils. Also included are small areas of Midessa soils that have a surface layer of loamy fine sand, or slopes of 3 to 5 percent.

The contrasting soils are small areas of Amarillo, Arvana, Portales, Posey, and Tokio soils that are on similar landscapes.

Soil Description

Midessa

Aspect(s): Northwest
Position(s) on landform(s): Plain; Playa slope
Parent material: Calcareous, loamy eolian and lacustrine deposits of Quaternary age

Typical Profile

A—0 to 9 inches; brown, moderately alkaline fine sandy loam; few fine calcium carbonate nodules; violently effervescent

Bk1—9 to 30 inches; pale brown, moderately alkaline sandy clay loam; about 8 percent calcium carbonate by volume in the form of filaments, nodules, and finely disseminated carbonates; violently effervescent

Bkk—30 to 60 inches; very pale brown, moderately alkaline sandy clay loam; about 52 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

B'k2—60 to 80 inches; light brown, moderately alkaline sandy clay loam; about 35 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: About 1 percent subrounded fine and medium gravel
Depth to first restrictive layer: Not present

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for lawns and landscaping or use as daily cover for landfills. The moderate available water capacity and high carbonate content of the soil are major limitations which can limit plant growth necessary for healthy lawns and landscaping. Pipelines, storage tanks, and other underground structures made of uncoated steel should be

protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations that can restrict plant growth necessary for healthy landscaping and turf.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

MPC—Midessa and Posey fine sandy loams, 3 to 8 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Midessa and similar soils: 50 percent
Posey and similar soils: 35 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Midessa soil and similar soils make up 50 percent of the map unit, and the Posey soil and similar soils make up 35 percent of the map unit. The contrasting soils make up 15 percent.

Included in mapping are small areas of Midessa and Posey soils that have a surface layer of loamy fine sand or that have slopes of 8 to 12 percent.

The contrasting soils are small areas of Amarillo, Arvana, Patricia, and Potter soils. Also included are borrow pits less than 3 acres in size or areas of narrow, linear sand dunes.

Soil Description

Midessa

Aspect(s): Northwest
Position(s) on landform(s): Backslope on draw
Parent material: Calcareous, loamy eolian and lacustrine deposits of Quaternary age

Typical Profile

A—0 to 7 inches; brown, moderately alkaline fine sandy loam; few fine calcium carbonate nodules; violently effervescent

Bk1—7 to 29 inches; pale brown, moderately alkaline sandy clay loam; about 8 percent calcium carbonate by volume in the form of filaments, nodules, and finely disseminated carbonates; violently effervescent

Bkk—29 to 60 inches; very pale brown, moderately alkaline sandy clay loam; about 52 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

B'k2—60 to 80 inches; light brown, moderately alkaline sandy clay loam; about 35 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 3 to 8 percent
Percent of area covered by surface fragments: About 2 percent subrounded fine and medium gravel
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Posey

Aspect(s): Northwest
Position(s) on landform(s): Backslope on draw
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 8 inches; reddish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; violently effervescent
Btk1—8 to 15 inches; reddish brown, moderately alkaline sandy clay loam; few films, filaments, and masses of calcium carbonate; violently effervescent
Btkk—15 to 37 inches; light reddish brown, moderately alkaline sandy clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent
B'tk2—37 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 35 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 3 to 8 percent
Percent of area covered by surface fragments: About 3 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are primarily used for rangeland and wildlife habitat. Some areas are used for improved pasture.
Cropland: These soils are poorly suited to cropland. The slope, droughtiness, moderate available water capacity, and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield moderate amounts of forage. The high carbonate content, moderate available water capacity, and medium runoff of the soils is a limitation. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: These soils are moderately suited to most urban uses. They are very limited as a site for lawns and landscaping or use as daily cover for landfills. The moderate available water capacity and high carbonate content of the soil are major limitations which can restrict plant growth necessary for healthy lawns and landscaping. Posey soils are very limited as a site for the construction of local roads and streets or use as road-fill material. Low soil strength is a limitation. Stabilizing,

strengthening, or replacing the base material can overcome these restrictions. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational Development: These soils are moderately suited to most recreational uses. They are very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations that can restrict plant growth necessary for healthy landscaping and turf.

Wildlife Habitat: Wind and water erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

NtC—Nutivoli fine sand, 3 to 8 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau; Sandhills
Elevation: 3,300 to 4,795 feet (1006 to 1463 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Nutivoli and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Nutivoli soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The similar soils are areas of Nutivoli that are effervescent throughout the horizons or soils that have thin bands of lamellae and a coarse-loamy particle size class. Also included in mapping are small areas of Nutivoli soils that have a loamy fine sand surface texture or slopes of 8 to 12 percent.

The contrasting soils are small areas where that have an argillic or calcic horizon less than 60 inches deep.

Soil Description

Nutivoli

Aspect(s): Northwest
Position(s) on landform(s): Dune
Parent material: Eolian sands of Holocene age

Typical Profile

A—0 to 6 inches; brown, slightly alkaline fine sand
C1—6 to 40 inches; yellowish red, slightly alkaline loamy fine sand
C2—40 to 80 inches; yellowish red, slightly alkaline fine sand

Properties and Qualities

Slope: 3 to 8 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 6.0 to 20 in/hr (Rapid)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.7 inches (Low)
Natural drainage class: Excessively drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Sand Hills 16-21" Pz
Ecological site number: R077CY034TX
Typical vegetation: Climax vegetation is tall and mid grasses, with sand bluestem, little bluestem, giant sand reed, and switchgrass dominating.

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.
Cropland: This soil is poorly suited to cropland. The slope, sand content, low available water capacity, droughtiness, and low natural fertility of the soil are major limitations. The hazard of wind erosion is severe.
Rangeland: This soil is moderately suited to rangeland. Native plants yield moderate amounts of forage. The low available water capacity and droughtiness of the soil is a limitation. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is poorly suited to most urban uses. They are very limited for use as sanitary facilities and building site development. The high sand content, poor filtering capacity, seepage, droughtiness, low natural fertility, and low available water holding capacity are major limitations. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational Development: This soil is poorly suited to recreational uses. The high sand content, slope, droughtiness, and low available water holding capacity of the soil is very limiting.
Wildlife Habitat: This soil has poor potential for use as wildlife habitat. The sandy surface texture is a major limitation and wind erosion is a potential hazard for grain and seed crops or wild herbaceous plants. Moderately arid conditions, which can limit plant growth necessary for good habitat is a minor limitation.

OcA—Olton clay loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,795 to 4,595 feet (853 to 1402 meters)

Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Olton and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Olton soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Olton are areas of soils that have a calcic horizon greater than 60 inches or soils that have linear extensibility of 6 or more in the upper 40 inches of the soil surface. Also included in mapping are Olton soils that have a surface texture of loam or slopes of 1 to 3 percent.

The contrasting soils are small areas where soils have less than 35 percent clay in the particle-size control section or soils calcareous in the upper part and have a calcic horizon less than 30 inches deep. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Olton

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 8 inches; brown, neutral clay loam
Bt—8 to 31 inches; brown, slightly alkaline clay loam
Btk1—31 to 48 inches; reddish brown, moderately alkaline clay loam; about 5 percent calcium carbonate by volume as films and filaments; violently effervescent
Btk2—48 to 80 inches; pink, moderately alkaline clay loam; about 35 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (Moderately slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.3 inches (High)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Deep Hardland 16-21" Pz
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few midgrasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.

Use and Management

Major land uses: These soils are used extensively for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The most common crops grown on this soil are cotton and grain sorghum. Other crops include wheat and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants are dominantly shortgrasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for septic tank absorption fields and for local roads and streets. The low soil strength and restricted permeability are major limitations. Because of low soil strength, special treatment is necessary to increase the stability of road sub-grades. The moderately slow permeability may cause failure of septic tank absorption systems, especially during prolonged wet periods. This limitation can be overcome by properly designing the absorption field and by increasing the size of the absorption area. The shrink-swell potential is somewhat limiting for dwellings or small commercial buildings. The shrink-swell can cause cracking of building foundations, brick walls, road surfaces, sidewalks, and pipelines. Adding sand or other non-expansive material can minimize the structural damage caused by shrinking and swelling of the soils.
Recreational Development: This soil is well suited to recreational uses.
Wildlife Habitat: The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PAB—Patricia and Amarillo loamy fine sands, 0 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)

Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Patricia and similar soils: 50 percent
Amarillo and similar soils: 45 percent
Contrasting soils: 5 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Patricia soil and similar soils make up 50 percent of the map unit. The Amarillo soil and similar soils make up 45 percent of the map unit, and the contrasting soils make up 5 percent.

Soils similar to Patricia and Amarillo are small areas of Brownfield and Tokio soils. Also included in mapping are small areas of Amarillo soils that have a fine sandy loam surface layer, areas of Patricia soils that have a fine sand surface layer, and areas of these soils with slopes of 3 to 5 percent.

Contrasting soils are small areas of Arvana, Midessa, Posey, and Seagraves soils. Arvana, Midessa, and Posey soils are in landscape positions similar to those of the Patricia and Amarillo soils. The Seagraves soils occur on lower landscape positions in depressions.

Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Patricia

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 12 inches; yellowish red, moderately alkaline loamy fine sand
Bt1—12 to 40 inches; red, neutral sandy clay loam
Bt2—40 to 78 inches; red, slightly alkaline sandy clay loam; very slightly effervescent
Btk—78 to 80 inches; red, strongly alkaline clay loam; about 40 percent calcium carbonate by volume in the form of masses, films, and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.6 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None

Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Sandy 16-21" Pz
Ecological site number: R077CY035TX
Typical vegetation: This is a tall grass climax. Nearly half of the grass component is composed of tall grasses such as little bluestem, sand bluestem, spike dropseed, and giant dropseed. The remainder is composed of mid and short grasses such as sideoats grama, sand dropseed, hooded windmillgrass, sand lovegrass, sand paspalum, fall witchgrass, hairy grama, needle and thread, and perennial threeawn. Sand sage, shinoak, and skunkbush make up the woody species.

Amarillo

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 16 inches; yellowish red, slightly alkaline loamy fine sand
Bt—16 to 53 inches; reddish brown, slightly alkaline sandy clay loam
Btkk—53 to 68 inches; pink, moderately alkaline sandy clay loam; about 60 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent
Btk—68 to 80 inches; yellowish red, moderately alkaline sandy clay loam; about 20 percent calcium carbonate by volume in the form of masses and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.4 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Sandy 16-21" Pz

Ecological site number: R077CY035TX
Typical vegetation: This is a tall grass climax. Nearly half of the grass component is composed of tall grasses such as little bluestem, sand bluestem, spike dropseed, and giant dropseed. The remainder is composed of mid and short grasses such as sideoats grama, sand dropseed, hooded windmillgrass, sand lovegrass, sand paspalum, fall witchgrass, hairy grama, needle and thread, and perennial threeawn. Sand sage, shinoak, and skunkbush make up the woody species.

Use and Management

Major land uses: Patricia and Amarillo soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: These soils are well suited to cropland. The most common crops grown are cotton, grain sorghum, and peanuts. Other crops include wheat, sunflowers, and forage sorghum. The hazard of wind erosion is severe. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: Native plants yield high amounts of forage. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, and invasion of woody species and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: These soils are well suited to most urban uses. Patricia soils are very limited as a site for sewage lagoons. Seepage is the major limitation, which can contaminate aquifers, wells, and streams. Lining the floor and sides of the sewage lagoon with relatively impervious material can minimize the potential for contamination.
Recreational Development: These soils are moderately suited to recreational uses. The high sand content of the soil is somewhat limiting for use as recreational areas.
Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PeA—Pep loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Pep and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Pep soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The similar soils include areas that are not calcareous in the surface horizon or a similar soil that has a gray colored subsoil. Also included in mapping are Pep soils that have a surface layer of very fine sandy loam or slopes of 1 to 3 percent.

The contrasting soils are small areas that do not have a mollic epipedon or soils that have an argillic or petrocalcic horizon.

Soil Description

Pep

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 10 inches; dark brown, moderately alkaline loam; strongly effervescent

Bw—10 to 16 inches; yellowish red, moderately alkaline loam; less than 2 percent visible calcium carbonate by volume as films, filaments, and finely disseminated carbonates; strongly effervescent;

Bk—16 to 32 inches; reddish yellow, moderately alkaline clay loam; about 20 percent calcium carbonate by volume as filaments and finely disseminated carbonates; violently effervescent

Bkk—32 to 80 inches; reddish yellow, moderately alkaline clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: About 1 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX

Typical vegetation: The natural plant community for this site is dominantly shortgrass and midgrasses and only a few woody species. The dominant grass species is usually blue grama. It resembles a clay loam range site except for the presence of more midgrasses such as sideoats grama, western wheatgrass, and vine mesquite. The site typifies a shortgrass/midgrass prairie.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.

Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is moderately suited to most urban uses. It is very limited for use as daily cover for landfills, lawns and landscaping, road-fill material, or the construction of roads and streets. The high carbonate content, moderate available water capacity, and low soil strength are major limitations. Because of low soil strength, special treatment is necessary to increase the stability of road sub-grades. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations. Other recreational use is somewhat limited because of dustiness. Applications of water or special surfacing material may be needed during dry periods to prevent excessive dustiness in areas that are subject to heavy foot traffic.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PeB—Pep loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)

Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Pep and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Pep soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The similar soils include areas that are not calcareous in the surface horizon or a similar soil that has a gray colored subsoil. Also included in mapping are Pep soils that have a surface layer of very fine sandy loam or slopes of 3 to 5 percent.

The contrasting soils are small areas that do not have a mollic epipedon or soils that have an argillic or petrocalcic horizon.

Soil Description

Pep

Aspect(s): Northwest
Position(s) on landform(s): Plain; Playa slope
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 9 inches; dark brown, moderately alkaline loam; strongly effervescent

Bw—9 to 15 inches; yellowish red, moderately alkaline loam; less than 2 percent visible calcium carbonate by volume as films, filaments, and finely disseminated carbonates; strongly effervescent;

Bk—15 to 30 inches; reddish yellow, moderately alkaline clay loam; about 20 percent calcium carbonate by volume as filaments and finely disseminated carbonates; violently effervescent

Bkk—30 to 80 inches; reddish yellow, moderately alkaline clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: About 2 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.1 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None

Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community for this site is dominantly shortgrass and midgrasses and only a few woody species. The dominant grass species is usually blue grama. It resembles a clay loam range site except for the presence of more midgrasses such as sideoats grama, western wheatgrass, and vine mesquite. The site typifies a shortgrass/midgrass prairie.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is moderately suited to rangeland. Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. It is very limited for use as daily cover for landfills, lawns and landscaping, road-fill material, or the construction of roads and streets. The high carbonate content, moderate available water capacity, and low soil strength are major limitations. Because of low soil strength, special treatment is necessary to increase the stability of road sub-grades. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations. Other recreational use is somewhat limited because of dustiness. Applications of water or special surfacing material may be needed during dry periods to prevent excessive dustiness in areas that are subject to heavy foot traffic.
Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PGE—Potter soils, 3 to 20 percent slopes

Setting

General location: Southern High Plains Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,295 to 4,700 feet (701 to 1433 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Potter and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Potter soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.
The soils similar to Potter are gravelly soils with slightly less than 35 percent rock fragments by volume in the particle-size control section.
The contrasting soils are small areas where soils have a petrocalcic horizon or soils that have a fine-loamy or coarse-loamy particle size class.
Also included in mapping are Potter soils with slopes of 20 to 30 percent and borrow pits less than 3 acres in size.

Soil Description

Potter

Aspect(s): Northwest
Position(s) on landform(s): Shoulder on draw; shoulder on escarpment
Parent material: Calcareous, loamy alluvium derived from the Ogallala Formation of Miocene-Pliocene age

Typical Profile

A—0 to 6 inches; grayish brown, moderately alkaline gravelly loam; about 16 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; strongly effervescent
Bk—6 to 15 inches; light brownish gray and light gray, moderately alkaline very gravelly fine sandy loam; about 38 percent by volume of strongly cemented calcium carbonate nodules and indurated calcrete fragments; many medium and coarse masses of calcium carbonate; violently effervescent
BCkk1—15 to 29 inches; white, strongly alkaline very gravelly fine sandy loam; about 53 percent by volume of very strongly cemented, thin platy calcrete fragments and nodules, 2.5 to 8 cm on the long axis, plates are fractured and undersides have about 2.5 to 6 mm long pendants of calcium carbonate; 32 percent of the volume is carbonate masses and loamy soil material; violently effervescent
BCkk2—29 to 80 inches; white, strongly alkaline extremely gravelly fine sandy loam; about 61 percent by volume of very strongly cemented, thick platy calcrete fragments and nodules, 2.5 to 15 cm on the long axis, plates are fractured; 26 percent of the volume is carbonate masses and loamy soil material; violently effervescent

Properties and Qualities

Slope: 3 to 20 percent
Percent of area covered by surface fragments: About 20 percent subangular (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 3.3 inches (Low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s
Land capability irrigated: None specified
Ecological site name: Very Shallow 16-24" Pz
Ecological site number: R077EY068TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.

Use and Management

Major land uses: These soils are used mainly as rangeland and wildlife habitat.
Cropland: This soil is not used as cropland. The low available water holding capacity, high carbonate content, droughtiness, slope, shallow rooting depth, and high rate of runoff are major limitations.
Rangeland: This soil is poorly suited to rangeland. Native plants yield low amounts of forage. The high carbonate content of the soil, low available water capacity, slope, and high rate of runoff are major limitations. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and low order perennial grasses or annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is poorly suited to urban uses. They are very limited for use as a site for sanitary facilities, small commercial buildings, lawns and landscaping, or shallow excavations. The slope, slow water movement, caving hazards, and high carbonate content of the soil are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational Development: These soils are poorly suited to most recreational uses. They are very limited as a site for playgrounds and golf fairways. The slope and high

carbonate content of the soil are major limitations. Other recreational use such as camp and picnic areas, paths and trails, and off-road motorcycle trails are somewhat limited because of slow water movement, high gravel content, and dustiness of the soil.

Wildlife Habitat: This soil has poor potential for use as wildlife habitat. The slope, arid conditions, and droughtiness of the soil are major limitations which restrict plant growth necessary for good habitat. The potential for water erosion is severe.

PoA—Portales loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,895 feet (823 to 1493 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Portales and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Portales soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Portales are small areas of Pep and Zita soils. Included are small areas of Portales soils that have a surface layer of sandy clay loam or very fine sandy loam and areas of Portales soils that have slopes of 1 to 3 percent.

The contrasting soils are small areas of Acuff, Arch, Estacado, Lofton, Lenorah, Midessa, and Sparenberg soils. Acuff, Arch, Estacado, Lenorah, and Midessa soils are on similar landscape positions. Lofton and Sparenberg soils are on slightly lower landscape positions.

Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Portales

Aspect(s): Northwest
Position(s) on landform(s): Interdune; Plain; Playa step
Parent material: Calcareous, loamy eolian and lacustrine deposits of Quaternary age

Typical Profile

A—0 to 15 inches; dark grayish brown, moderately alkaline loam; few fine masses of calcium carbonate, violently effervescent

Bk1—15 to 35 inches; grayish brown, moderately alkaline clay loam; about 8 percent calcium carbonate by volume as masses and finely disseminated carbonates; violently effervescent

Bk2—35 to 43 inches; light grayish brown, moderately alkaline loam; about 25 percent calcium carbonate by volume as masses and finely disseminated carbonates; violently effervescent

Bkk—43 to 80 inches; light gray, moderately alkaline clay loam; about 60 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: About 1 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.6 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community for this site is dominantly shortgrass and midgrasses and only a few woody species. The dominant grass species is usually blue grama. It resembles a clay loam range site except for the presence of more midgrasses such as sideoats grama, western wheatgrass, and vine mesquite. The site typifies a shortgrass/midgrass prairie.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is moderately suited to rangeland. Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for lawns and landscaping or use as daily cover for landfills. The moderate available water capacity and high carbonate content of the soil are major limitations which can limit plant growth necessary for healthy lawns and landscaping. Low soil strength is a major limitation for the construction of local roads and streets or use as road-fill material. Stabilizing, strengthening, or replacing the base material can overcome many of these restrictions. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations that can restrict plant growth necessary for healthy landscaping and turf. Other recreational use is somewhat limited because of dustiness. Applications of water or special surfacing material may be needed during dry periods to prevent excessive dustiness in areas that are subject to heavy foot traffic.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PoB—Portales loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,895 feet (823 to 1493 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Portales and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Portales soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Portales are small areas of Pep and Zita soils. Included are small areas of Portales soils that have a surface layer of sandy clay loam or very fine sandy loam and areas of Portales soils that have slopes of 3 to 5 percent.

The contrasting soils are small areas of Acuff, Arch, Estacado, Kimberson, Lenorah, and Midessa soils that are on similar landscape positions.

Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Portales

Aspect(s): Northwest
Position(s) on landform(s): Interdune; Plain; Playa slope
Parent material: Calcareous, loamy eolian and lacustrine deposits of Quaternary age

Typical Profile

A—0 to 14 inches; dark grayish brown, moderately alkaline loam few fine masses of calcium carbonate, violently effervescent

Bk1—14 to 35 inches; grayish brown, moderately alkaline clay loam; about 8 percent calcium carbonate by volume as masses and finely disseminated carbonates; violently effervescent

Bk2—35 to 43 inches; light grayish brown, moderately alkaline loam; about 25 percent calcium carbonate by volume as masses and finely disseminated carbonates; violently effervescent

Bkk—43 to 80 inches; light gray, moderately alkaline clay loam; about 60 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent

Percent of area covered by surface fragments: About 2 percent subrounded (shape or size unspecified)

Depth to first restrictive layer: Not present

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer

Salinity, representative within 40 inches: Not saline

Salinity, maximum within 40 inches: Not saline

Sodicity, representative within 40 inches: Not sodic

Sodicity, maximum within 40 inches: Not sodic

Representative total available water capacity to 60 inches: About 7.6 inches (Moderate)

Natural drainage class: Well drained

Runoff: Low

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e

Land capability irrigated: 3e

Ecological site name: Limy Upland 16-21" Pz

Ecological site number: R077CY028TX

Typical vegetation: The natural plant community for this site is dominantly shortgrass and midgrasses and only a few woody species. The dominant grass species is usually blue grama. It resembles a clay loam range site except for the presence of more midgrasses such as sideoats grama, western wheatgrass, and vine mesquite. The site typifies a shortgrass/midgrass prairie.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.

Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management

can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: This soil is moderately suited to rangeland. Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for lawns and landscaping or use as daily cover for landfills. The moderate available water capacity and high carbonate content of the soil are major limitations which can limit plant growth necessary for healthy lawns and landscaping. Low soil strength is a major limitation for the construction of local roads and streets or use as road-fill material. Stabilizing, strengthening, or replacing the base material can overcome many of these restrictions. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations that can restrict plant growth necessary for healthy landscaping and turf. Other recreational use is somewhat limited because of dustiness. Applications of water or special surfacing material may be needed during dry periods to prevent excessive dustiness in areas that are subject to heavy foot traffic.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PsA—Posey fine sandy loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Posey and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Posey soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Posey are areas of Midessa soils. Also included are small areas of Posey soils with slopes of 1 to 3 percent.
The contrasting soils are small areas of Amarillo, Arvana, Patricia, Pep, and Tokio soils that are on similar landscape positions.

Soil Description

Posey

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 11 inches; reddish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; violently effervescent
Btk1—11 to 19 inches; reddish brown, moderately alkaline sandy clay loam; few films, filaments, and masses of calcium carbonate; violently effervescent
Btkk—19 to 39 inches; light reddish brown, moderately alkaline sandy clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent
B'tk2—39 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 35 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: About 3 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.3 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species.

There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.

Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat, peanuts, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: This soil is moderately suited to rangeland. Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for lawns and landscaping or use as daily cover for landfills. The moderate available water capacity and high carbonate content of the soil are major limitations which can limit plant growth necessary for healthy lawns and landscaping. Low soil strength is a major limitation for the construction of local roads and streets or use as road-fill material. Stabilizing, strengthening, or replacing the base material can overcome many of these restrictions. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations that can restrict plant growth necessary for healthy landscaping and turf.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PsB—Posey fine sandy loam, 1 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Posey and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Posey soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Posey are areas of Midessa soils. Also included are small areas of Posey soils with slopes of 3 to 5 percent.

The contrasting soils are small areas of Amarillo, Arvana, Patricia, Pep, and Sharvana soils that are on similar landscape positions.

Soil Description

Posey

Aspect(s): Northwest
Position(s) on landform(s): Plain; Playa slope
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 10 inches; reddish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; violently effervescent

Btk1—10 to 18 inches; reddish brown, moderately alkaline sandy clay loam; few films, filaments, and masses of calcium carbonate; violently effervescent

Btkk—18 to 39 inches; light reddish brown, moderately alkaline sandy clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

B'tk2—39 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 35 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 1 to 3 percent
Percent of area covered by surface fragments: About 3 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.3 inches (Moderate)
Natural drainage class: Well drained
Runoff: Low
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 3e

Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The moderate available water capacity and high carbonate content of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat, peanuts, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is moderately suited to rangeland. Native plants yield moderate amounts of forage. The high carbonate content and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to most urban uses. It is very limited as a site for lawns and landscaping or use as daily cover for landfills. The moderate available water capacity and high carbonate content of the soil are major limitations which can limit plant growth necessary for healthy lawns and landscaping. Low soil strength is a major limitation for the construction of local roads and streets or use as road-fill material. Stabilizing, strengthening, or replacing the base material can overcome many of these restrictions. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The moderate available water capacity and high carbonate content of the soil are major limitations that can restrict plant growth necessary for healthy landscaping and turf.
Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

PsC—Posey fine sandy loam, 3 to 8 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Posey and similar soils: 80 percent
Contrasting soils: 20 percent

Composition is based on observations, descriptions, and or transects of the map unit

Soil Description

Posey

Aspect(s): Northwest
Position(s) on landform(s): Backslope on draw; Playa slope
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 8 inches; reddish brown, moderately alkaline fine sandy loam; few calcium carbonate nodules; violently effervescent
Btk1—8 to 15 inches; reddish brown, moderately alkaline sandy clay loam; few films, filaments, and masses of calcium carbonate; violently effervescent
Btkk—15 to 37 inches; light reddish brown, moderately alkaline sandy clay loam; about 55 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent
B'tk2—37 to 80 inches; reddish yellow, moderately alkaline sandy clay loam; about 35 percent calcium carbonate by volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 3 to 8 percent
Percent of area covered by surface fragments: About 3 percent subrounded (shape or size unspecified)
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline

Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.2 inches (Moderate)
Natural drainage class: Well drained
Runoff: Medium
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6e
Land capability irrigated: None specified
Ecological site name: Limy Upland 16-21" Pz
Ecological site number: R077CY028TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: Widely used for dryland and irrigated cropland.

RcA—Ranco clay, 0 to 1 percent slopes, frequently ponded

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Ranco and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Ranco soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Ranco are small areas of Lamesa and Sparenberg soils. Also included are areas of Ranco soils with an overburden of loamy soil material that has eroded from surrounding upland soils.

The contrasting soils are small areas of Lofton, Pep, Portales, and Seagraves soils. Lofton and Seagraves soils are on similar landscape positions. Pep and Portales soils are on slightly higher landscape positions.

Soil Description

Ranco

Aspect(s): Northwest
Position(s) on landform(s): Circular gilgai on playa floor
Parent material: Clayey lacustrine deposits of Quaternary age

Typical Profile

A—0 to 9 inches; very dark brown, slightly alkaline clay; slightly effervescent
Bw—9 to 25 inches; very dark gray, moderately alkaline clay few black concretions and a few black masses of iron-manganese; common yellowish red masses of iron accumulation on ped surfaces; few dark gray iron depletions on ped surfaces
Bss1—25 to 61 inches; dark gray, moderately alkaline clay; about 2 percent nodules of calcium carbonate, strongly effervescent
Bss2—61 to 80 inches; dark gray, moderately alkaline clay; about 2 percent nodules of calcium carbonate, strongly effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Poorly drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Frequent
Depth to seasonal water table: Present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6w
Land capability irrigated: None specified
Ecological site name: Playa 16-21" Pz
Ecological site number: R077CY027TX
Typical vegetation: The natural plant community of a playa is highly variable and dependent on the hydrology of the playa basin being considered. The dominance of hydrophytic plants or upland plants depends on the degree, frequency, and time of inundation. Vegetation varies according to the amount of water available during the growing season. On average years, this site is usually inundated and saturated for longer periods. The natural plant community is dominantly a mixture of hydrophytic forbs, grasses, and grasslike plants. The most prevalent species on the site is creeping spikerush, Pennsylvania smartweed, saltmarsh aster, bur ragweed, curly dock, bushy knotweed, and sedges. Varying amounts of grasses are present and include knotgrass, barnyard grass, and western wheatgrass. In areas of standing water, southern cattail, softstem bulrush, and spiked arrowhead may be present. Occasionally there will be a few willows and cottonwoods present around the periphery of the playa.

Use and Management

Major land uses: These soils are used primarily for wildlife habitat. A few areas are used as rangeland.
Cropland: This soil is poorly suited to cropland. The frequent ponding, wetness, depth to saturated zone, and clayey texture of the soil, which can restrict root development are major limitations.

Rangeland: This soil is poorly suited to rangeland. Frequent ponding is a major limitation and prolonged periods of inundation decrease productivity. Large areas of bare ground are common after extended periods of ponding and require time to reestablish native vegetation. The dominant plant species on these soils yield poor quality forage for livestock use. Proper stocking rates, brush management, and controlled grazing can help improve productivity.

Urban Development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. The depth to a saturated zone, frequent ponding, high clay content, restricted permeability, high shrink-swell potential, and low strength are major limitations. Overcoming these limitations is difficult and costly. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational Development: This soil is poorly suited to recreational uses. The depth to a saturated zone, frequent ponding, and high clay content of the soil is very limiting.

Wildlife Habitat: The clayey surface texture, shallow water table, and frequent ponding are major limitations that affect plant growth necessary for good habitat. Dove, pheasant, and quail make limited use of this habitat for food and cover. When ponded, these soils are preferred sites for waterfowl, such as ducks and geese that use these areas for food, water, and cover.

SgA—Seagraves fine sandy loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Seagraves and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Seagraves soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Seagraves are small areas of Amarillo, Lamesa, and Tokio soils.

The contrasting soils are small areas of Acuff, Midessa, Patricia, Portales, Ranco, and Sparenberg soils. The Acuff, Midessa, Patricia, and Portales soils are on slightly higher landscape positions. Ranco and Sparenberg soils are on similar landscape positions.

Soil Description

Seagraves

Aspect(s): Northwest
Position(s) on landform(s): Playa floor
Parent material: Recent sandy eolian deposits over loamy lacustrine deposits of Quaternary age

Typical Profile

Ap—0 to 25 inches; light brown, slightly alkaline fine sandy loam
Ab—25 to 39 inches; brown, slightly alkaline loamy fine sand
Btb—39 to 57 inches; brown, slightly alkaline sandy clay loam
Btkb—57 to 80 inches; light brownish gray, strongly alkaline clay; about 25 percent calcium carbonate by volume as masses and nodules; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.06 to 0.2 in/hr (Slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.5 inches (Moderate)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Sandy Loam 16-21" Pz
Ecological site number: R077CY036TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: These soils are used mainly as cropland and habitat for wildlife. Some areas are used as rangeland.
Cropland: This soil is moderately suited to cropland. The moderate available water capacity and occasional ponding are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: This soil is well suited to rangeland. Native plants yield high amounts of forage. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. The restricted permeability, seepage, and occasional ponding are major limitations. Overcoming many of these limitations is difficult and costly. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.

Recreational Development: This soil is poorly suited to most recreational uses. Occasional ponding is very limiting. The season, frequency, and duration of ponding should be considered in planning recreational areas.

Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

ShB—Sharvana fine sandy loam, 0 to 3 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Sharvana and similar soils: 85 percent
Contrasting soils: 15 percent

Based on field observations of the map unit during the survey, the best estimate is that the Sharvana soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Sharvana are small areas of Arvana, Kimberson, and Potter soils. Also included are small areas of Sharvana soils that have a surface layer of loamy fine sand. The contrasting soils are small areas of Amarillo, Acuff, Patricia, Pep, Posey, and Tokio soils that are on similar landscape positions.

Soil Description

Sharvana

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

A—0 to 6 inches; brown, neutral fine sandy loam
Bt—6 to 16 inches; dark reddish brown, slightly alkaline sandy clay loam
Bkkm—16 to 36 inches; pink, indurated platy caliche; laminar in the upper 2 inches; undersides of plates have small pendants of calcium carbonate; violently effervescent

Bkk—36 to 80 inches; pink, moderately alkaline extremely gravelly sandy loam; about 62 percent by volume gravel size calcium carbonate nodules that are strongly cemented; about 75 percent calcium carbonate by total volume as masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 3 percent
Percent of area covered by surface fragments: About 6 percent subrounded (shape or size unspecified), about 5 percent angular channers
Depth to first restrictive layer: 8 to 22 inches (Petrocalcic)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 1.8 inches (Very low)
Natural drainage class: Well drained
Runoff: High
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 6s
Land capability irrigated: 4s
Ecological site name: Very Shallow 16-21" Pz
Ecological site number: R077CY037TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.

Use and Management

Major land uses: Sharvana soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland or improved pasture.
Cropland: This soil is poorly suited to cropland. The shallow rooting depth, very low available water capacity, droughtiness, and high runoff are severe limitations. The hazard of wind erosion is severe. The most common crops grown are wheat and forage sorghum. Other crops include cotton and grain sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.

Rangeland: This soil is poorly suited to rangeland. Native plants yield low amounts of forage. The depth to a cemented pan, very low available water capacity, and high runoff are major limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.

Urban Development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. The depth to a cemented pan, carbonate content, and droughtiness are major limitations. Overcoming many of these limitations is difficult and costly.

Recreational Development: This soil is poorly suited to recreational uses. The shallow rooting depth, carbonate content, and very low available water capacity of the soil are very limiting.

Wildlife Habitat: The shallow rooting depth, very low available water capacity, and arid conditions are major limitations that restrict plant growth necessary for good habitat. The potential for wind and water erosion is severe.

SL—Water, intermittent, salt lake

Setting

General location: Southern High Plains, Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Plateau
Elevation: 2,195 to 3,745 feet (670 to 1143 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Water, intermittent, salt lake and similar soils: 100 percent

Composition is based on observations, descriptions, and or transects of the map unit

Soil Description

Water Intermittent, Salt Lake

Aspect(s): Northwest
Position(s) on landform(s): Basin floor; Pluvial lake (relict)
Parent material: Loamy lacustrine deposits of Quaternary age

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.2 to 0.6 in/hr (Moderately slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic
Representative total available water capacity to 60 inches: About 2.4 inches (Very low)

Natural drainage class: Very poorly drained
Runoff: Negligible
Flooding frequency: Not flooded
Ponding frequency: Frequent
Depth to seasonal water table: Present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7w
Land capability irrigated: None specified
Ecological site name: Not specified
Ecological site number: Not specified
Typical vegetation: Barren land.

Use and Management

Major land uses: This map unit is occasionally used by migratory waterfowl and other transient wildlife that water here following rainy periods or for cover; however, since there is little or no vegetation, this use is very limited. These areas are severely limited for other uses.

Cropland: These areas are poorly suited to cropland. The frequent ponding, depth to a saturated zone, high salinity, and high sodium content are major limitations. The hazard of erosion is severe.

Rangeland: These areas are poorly suited to rangeland. Frequent and prolonged ponding, depth to a saturated zone, very high sodium, and very high salinity are major limitations. Dominantly the ground is bare and does not support plant growth. The hazard of wind erosion is severe.

Urban Development: These areas are poorly suited to urban uses. They are very limited as a site for sanitary facilities or building site development. The depth to a saturated zone, frequent ponding, high shrink-swell, low strength, restricted permeability, high sodium, and high salinity are major limitations. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these areas. This can be overcome by providing cathodic protection or by using galvanized steel.

Recreational Development: These areas are poorly suited to recreational uses. The depth to a saturated zone, frequent ponding, high sodium content, clay content, and salinity are very limiting.

Wildlife Habitat: The shallow water table, frequent ponding, very high salinity, and very high sodium content are major limitations. These areas do not support plant growth and are barren. Migratory wildlife, such as sandhill crane, make limited use of these areas for water and cover.

SpA—Sparenberg clay, 0 to 1 percent slopes, occasionally ponded

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,595 to 4,595 feet (792 to 1402 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Sparenberg and similar soils: 90 percent
Contrasting soils: 10 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Sparenberg soil and similar soils make up 90 percent of the map unit, and contrasting soils make up 10 percent.

The soils similar to Sparenberg are small areas of Lamesa and Ranco soils.

Also included are areas of Sparenberg soils that are shallow to a calcic horizon or have an overburden of loamy soil material that has eroded from surrounding upland soils.

The contrasting soils are small areas of Arch, Lofton, Pep, Portales, Seagraves, and Zita soils. Seagraves soils are on similar landscape positions. Arch, Lofton, Pep, Portales, and Zita soils are on slightly higher landscape positions.

Soil Description

Sparenberg

Aspect(s): Northwest
Position(s) on landform(s): Circular gilgai on playa floor
Parent material: Clayey lacustrine deposits of Quaternary age

Typical Profile

Ap—0 to 4 inches; dark grayish brown, moderately alkaline clay; few black iron-manganese concretions

Bw—4 to 10 inches; dark gray, moderately alkaline clay; few strong brown iron stains in pores; few black iron-manganese concretions

Bss—10 to 61 inches; dark gray, moderately alkaline clay; few fine calcium carbonate nodules; few black iron-manganese concretions

Bkss—61 to 80 inches; grayish brown, moderately alkaline clay; about 5 percent calcium carbonate by volume as masses and nodules; slightly effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 9.1 inches (High)
Natural drainage class: Somewhat poorly drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: Occasional
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4w
Land capability irrigated: None specified
Ecological site name: Playa 16-21" Pz

Ecological site number: R077CY027TX
Typical vegetation: The natural plant community of a playa is highly variable and dependent on the hydrology of the playa basin being considered. The dominance of hydrophytic plants or upland plants depends on the degree, frequency, and time of inundation. Vegetation varies according to the amount of water available during the growing season. On average years, the dominant plant community for this site is a mixture of upland grasses and forbs with highly variable amounts of hydrophytic plants present. Very few shrubs or woody plants occur on this site. The most common plants are western wheatgrass, vine mesquite, barnyard grass, buffalograss, bur ragweed, saltmarsh aster, sedges, coreopsis, lambs quarters, cocklebur, curly dock, Pennsylvania smartweed, and common spikerush.

Use and Management

Major land uses: Sparenberg soils are used primarily as rangeland and habitat for wildlife. These soils are not used extensively as cropland.
Cropland: This soil is moderately suited to cropland. The clayey texture of the soil, which can restrict root development, and occasional ponding are limitations. The most common crops grown are cotton and grain sorghum. Other crops include wheat and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is moderately suited to rangeland. High yields of forage can be obtained during favorable years. Occasional ponding and the high clay content of the soil are limitations that can restrict plant growth. Other concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is poorly suited to urban uses. It is very limited as a site for sanitary facilities and building site development. Occasional ponding, high clay content, restricted permeability, high shrink-swell potential, and low strength are major limitations. Overcoming many of these limitations is difficult and costly. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel. Under certain conditions, trench sidewalls can become highly unstable in this soil. Trenches that have been excavated to more than a depth of 5 feet should be shored or the sidewall should be graded to an angle that ensures safe working conditions.
Recreational Development: This soil is poorly suited to recreational uses. The high clay content of the soil and occasional ponding is very limiting.
Wildlife Habitat: The clayey surface texture is a major limitation that affects plant growth necessary for good habitat. Occasional ponding is a minor limitation. Waterfowl, such as ducks and geese, make limited use of this habitat for food and cover.

TkA—Tokio fine sandy loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part

Landscape: Plateau
Elevation: 2,700 to 4,300 feet (823 to 1311 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Tokio and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Tokio soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Tokio are areas that have an argillic horizon and do not have a slight clay decrease in the upper 60 inches of the soil. Also included in mapping are Tokio soils that have a loamy fine sand surface texture or slopes of 1 to 3 percent.

The contrasting soils are small areas that have a mollic epipedon, a calcic or petrocalcic horizon less than 40 inches deep, or soils without an argillic horizon and are calcareous throughout. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Tokio

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Recent sandy eolian deposits over calcareous, loamy lacustrine deposits of Quaternary age

Typical Profile

Ap—0 to 9 inches; brown, moderately alkaline fine sandy loam
Ab—9 to 22 inches; brown, moderately alkaline fine sandy loam
Btb—22 to 34 inches; pale brown, moderately alkaline sandy clay loam
Btkb—34 to 57 inches; light gray, moderately alkaline clay loam; about 30 percent calcium carbonate by volume in the form of masses; violently effervescent
2Bkb—57 to 80 inches; light gray, strongly alkaline fine sandy loam; about 10 percent calcium carbonate by volume in the form of masses; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.5 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible

Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Sandy Loam 16-21" Pz
Ecological site number: R077CY036TX
Typical vegetation: The natural plant community is a mixture of short and midgrasses with a smaller tall grass compliment. Midgrasses tend to dominate over most of the site with sideoats grama being the most prevalent midgrass species. Blue grama is the dominant short grass species and little bluestem the dominant tall grass species. There are small areas that may occur within the site where blue grama is more prevalent. Woody plants are few but include yucca, catclaw acacia, and sand sage.

Use and Management

Major land uses: Tokio soils are used extensively for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The moderate available water capacity is a limitation. The hazard of wind erosion is severe. The most common crops grown are cotton and grain sorghum. Other crops include peanuts, wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is well suited to rangeland. Native plants yield high amounts of forage. The moderate available water capacity of the soil is a minor limitation. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is well suited to most urban uses. It is very limited as a site for sewage lagoons and area sanitary landfills. The hazard of seepage, which can contaminate aquifers, wells, and streams are major limitations. Lining the floor and sides of the sewage lagoon or sanitary landfill with relatively impervious material can minimize the potential for contamination.
Recreational Development: This soil is well suited to recreational uses.
Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

TkB—Tokio loamy fine sand, 0 to 2 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,300 feet (823 to 1311 meters)

Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Tokio and similar soils: 85 percent
Contrasting soils: 15 percent

Based on transect data and other field observations of the map unit during the survey, the best estimate is that the Tokio soil and similar soils make up 85 percent of the map unit, and contrasting soils make up 15 percent.

The soils similar to Tokio are areas that have an argillic horizon and do not have a slight clay decrease in the upper 60 inches of the soil. Also included in mapping are Tokio soils that have a fine sandy loam surface texture or slopes up to 3 percent.

The contrasting soils are small areas that have a mollic epipedon, a calcic or petrocalcic horizon less than 40 inches deep, or soils without an argillic horizon and are calcareous throughout. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Tokio

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Recent sandy eolian deposits over calcareous, loamy lacustrine deposits of Quaternary age

Typical Profile

Ap—0 to 11 inches; light brown, moderately alkaline loamy fine sand
Ab—11 to 26 inches; brown, moderately alkaline fine sandy loam
Btb—26 to 35 inches; pale brown, moderately alkaline sandy clay loam
Btkb—35 to 57 inches; light gray, moderately alkaline clay loam; about 30 percent calcium carbonate by volume in the form of masses; violently effervescent
2Bkb—57 to 80 inches; light gray, strongly alkaline fine sandy loam; about 10 percent calcium carbonate by volume in the form of masses; violently effervescent

Properties and Qualities

Slope: 0 to 2 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic
Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 8.0 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4e
Land capability irrigated: 3e
Ecological site name: Sandy 16-21" Pz
Ecological site number: R077CY035TX
Typical vegetation: This is a tall grass climax. Nearly half of the grass component is composed of tall grasses such as little bluestem, sand bluestem, spike dropseed, and giant dropseed. The remainder is composed of mid and short grasses such as sideoats grama, sand dropseed, hooded windmillgrass, sand lovegrass, sand paspalum, fall witchgrass, hairy grama, needle and thread, and perennial threeawn. Sand sage, shinoak, and skunkbush make up the woody species.

Use and Management

Major land uses: These soils are primarily used for cropland. A few small areas are used as improved pasture or rangeland.
Cropland: This soil is moderately suited to cropland. The moderate available water capacity and droughtiness of the soil are limitations. The hazard of wind erosion is severe. The most common crops grown are cotton, grain sorghum, and peanuts. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is moderately suited to rangeland. Native plants yield moderate to high amounts of forage. Droughtiness and moderate available water capacity of the soil are limitations. The hazard of wind erosion is severe. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is well suited to most urban uses. It is very limited as a site for sewage lagoons and area sanitary landfills. The hazard of seepage, which can contaminate aquifers, wells, and streams are major limitations. Lining the floor and sides of the sewage lagoon or sanitary landfill with relatively impervious material can minimize the potential for contamination.
Recreational Development: This soil is moderately suited to recreational uses. The moderate available water capacity and high sand content of the soil are minor limitations.
Wildlife Habitat: Wind erosion is a potential hazard for grain and seed crops used for food and cover. The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

W—Water

A small, natural or constructed, lake, pond, or pit that contains water most of the year. It is typically 5 to 40 acres in size and used mainly for livestock water, migratory waterfowl, and other wildlife.

YeA—Yellowlake silty clay loam, 0 to 1 percent slopes, rarely ponded

Setting

General location: The Southern High Plains of western Texas (sub-MLRA-77E). The series is of minor extent.
Southern High Plains Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Plateau
Elevation: 2,900 to 4,300 feet (884 to 1311 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Yellowlake and similar soils: 80 percent
Contrasting soils: 20 percent

Composition is based on observations, descriptions, and or transects of the map unit

Soil Description

Yellowlake

Aspect(s): Northwest
Position(s) on landform(s): Basin floor; Riser on lakebed (relict)
Parent material: Calcareous, clayey lacustrine deposits of Quaternary age over clayey alluvium derived from limestone, sandstone, and shale of Cretaceous age

Typical Profile

A—0 to 14 inches; dark grayish brown, moderately alkaline silty clay loam; violently effervescent
Btn—14 to 22 inches; light gray, strongly alkaline clay; strongly saline; strongly sodic; violently effervescent
Btny—22 to 45 inches; grayish brown, strongly alkaline clay; about 20 percent gypsum by volume as fine crystals and pockets of gyp crystals; strongly saline; strongly sodic; violently effervescent
BCny—45 to 66 inches; pale yellow, strongly alkaline clay; about 10 percent gypsum by volume as fine crystals and pockets of gyp crystals; about 2 percent selenite crystals, strongly saline, strongly sodic, violently effervescent
C—66 to 80 inches; pale yellow, strongly alkaline clay; about 2 percent pockets of gypsum crystals, strongly saline, strongly sodic, violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: 14 inches (Natric); 14 inches (Salic)
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Saline
Salinity, maximum within 40 inches: Saline
Sodicity, representative within 40 inches: Sodic
Sodicity, maximum within 40 inches: Sodic

Representative total available water capacity to 60 inches: About 2.3 inches (Very low)
Natural drainage class: Moderately well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Present within 80 inches

Interpretive Groups

Land capability nonirrigated: 4s
Land capability irrigated: None specified
Ecological site name: Wet Saline 16-21" Pz
Ecological site number: R077CY689TX
Typical vegetation: The natural plant community for this site is a mixture of salt tolerant grasses and grasslike plants, forbs, and shrubs. The vegetation on most of the site is a shrub dominant with salt cedar (tamarix) and baccharis being the two most prevalent species. In open areas and in the understory there are varying amounts of alkali sacaton, Texas dropseed, creeping muhly, jointtail, inland saltgrass, sedge and rushes, and occasionally some western wheatgrass. Forbs include kochia, smartweed, dock, and annual forbs. In areas of standing water cattails may be present. In extreme saline areas vegetation is sparse. Occasionally there will be a few willows and cottonwoods present.

Use and Management

Major land uses: These soils are used primarily for rangeland and wildlife habitat.

YhE—Yellowhouse gravelly clay loam, 3 to 20 percent slopes

Setting

General location: The Southern High Plains of Texas (sub-MLRA-77E).
Southern High Plains Breaks of western Texas and eastern New Mexico
Major land resource area: 77E—Southern High Plains, Breaks
Landscape: Breaks
Elevation: 2,595 to 3,745 feet (792 to 1142 meters)
Mean annual precipitation: 17 to 22 inches (432 to 559 millimeters)
Mean annual air temperature: 59 to 63 degrees F (15 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Yellowhouse and similar soils: 85 percent
Contrasting soils: 15 percent

Composition is based on observations, descriptions, and or transects of the map unit

Soil Description

Yellowhouse

Aspect(s): Northwest
Position(s) on landform(s): Footslope on escarpment; backslope on valley side
Parent material: Calcareous, loamy colluvium from the Ogallala Formation of Miocene-Pliocene age over residuum weathered from limestone, sandstone, and shale of Cretaceous age

Typical Profile

A—0 to 5 inches; pale yellow, moderately alkaline gravelly clay loam; about 25 percent by volume 2 to 75 mm diameter fragments of moderately cemented calcium carbonate and limestone; violently effervescent

Bw1—5 to 10 inches; pale yellow, moderately alkaline clay loam; about 14 percent by volume 2 to 75 mm pararock fragments consisting of very strongly cemented calcium carbonate and limestone; violently effervescent

Bw2—10 to 22 inches; light yellowish brown, strongly alkaline clay; about 9 percent by volume 2 to 75 mm pararock fragments consisting of very strongly cemented calcium carbonate and limestone; violently effervescent

BC—22 to 27 inches; light yellowish brown, moderately alkaline gravelly clay; about 23 percent by volume 2 to 75 mm pararock fragments consisting of very strongly cemented calcium carbonate and limestone; slightly effervescent

Cr—27 to 80 inches; weakly cemented siltstones, shales, and moderately cemented thin limestone bedrock; thin layers of interstratified gypsum and soluble salt crystals along bedding planes; slightly saline; slightly effervescent

Properties and Qualities

Slope: 3 to 45 percent

Percent of area covered by surface fragments: About 8 percent angular (shape or size unspecified), about 10 percent subrounded (shape or size unspecified), about 1 percent subrounded (shape or size unspecified)

Depth to first restrictive layer: 27 inches (Paralithic bedrock)

Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)

Slowest permeability to 60 inches, within and below first cemented restrictive layer: 0.001 to 0.06 in/hr (Very slow)

Salinity, representative within 40 inches: Not saline

Salinity, maximum within 40 inches: Not saline

Sodicity, representative within 40 inches: Not sodic

Sodicity, maximum within 40 inches: Sodic

Representative total available water capacity to 60 inches: About 3.3 inches (Low)

Natural drainage class: Well drained

Runoff: Very high

Flooding frequency: None

Ponding frequency: None

Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 7s

Land capability irrigated: None specified

Ecological site name: Very Shallow 16-24" Pz

Ecological site number: R077EY068TX

Typical vegetation: The natural plant community is a mixture of short and midgrasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, ephedra, skunkbush, and feather dalea are the major woody species.

Use and Management

Major land uses: These soils are used nearly exclusively for rangeland.

ZmA—Zita loam, 0 to 1 percent slopes

Setting

General location: Southern High Plains of western Texas and eastern New Mexico.
Major land resource area: 77C—Southern High Plains, Southern Part
Landscape: Plateau
Elevation: 2,700 to 4,700 feet (823 to 1433 meters)
Mean annual precipitation: 17 to 21 inches (432 to 533 millimeters)
Mean annual air temperature: 57 to 63 degrees F (14 to 17 degrees C)
Frost-free period: 185 to 220 days

Composition

Zita and similar soils: 90 percent
Contrasting soils: 10 percent

Based on field observations of the map unit during the survey, the best estimate is that the Zita soil and similar soils make up 80 percent of the map unit, and contrasting soils make up 20 percent.

The soils similar to Zita are areas where the soils are similar to Zita but have argillic horizons. Also included in mapping are Zita soils that have a surface layer of fine sandy loam or have slopes of 1 to 3 percent.

The contrasting soils are small areas where soils are highly calcareous in all horizons or soils that have a calcic horizon greater than 40 inches deep. Included in mapping are small playas and depressions that are too small to map at this scale.

Soil Description

Zita

Aspect(s): Northwest
Position(s) on landform(s): Plain
Parent material: Calcareous, loamy eolian deposits from the Blackwater Draw Formation of Pleistocene age

Typical Profile

Ap—0 to 18 inches; dark grayish brown, moderately alkaline loam

Bw—18 to 24 inches; light brownish gray, moderately alkaline clay loam; less than 2 percent calcium carbonate by volume as nodules, strongly effervescent

Bkk1—24 to 35 inches; white, moderately alkaline clay loam; about 50 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Bkk2—35 to 80 inches; very pale brown, moderately alkaline clay loam; about 60 percent calcium carbonate by volume in the form of masses, nodules, and finely disseminated carbonates; violently effervescent

Properties and Qualities

Slope: 0 to 1 percent
Percent of area covered by surface fragments: Unspecified
Depth to first restrictive layer: Not present
Slowest soil permeability to 60 inches, above first cemented restrictive layer: 0.6 to 2.0 in/hr (Moderate)
Slowest permeability to 60 inches, within and below first cemented restrictive layer: No restrictive layer
Salinity, representative within 40 inches: Not saline
Salinity, maximum within 40 inches: Not saline
Sodicity, representative within 40 inches: Not sodic

Sodicity, maximum within 40 inches: Not sodic
Representative total available water capacity to 60 inches: About 7.9 inches (Moderate)
Natural drainage class: Well drained
Runoff: Negligible
Flooding frequency: None
Ponding frequency: None
Depth to seasonal water table: Not present within 80 inches

Interpretive Groups

Land capability nonirrigated: 3e
Land capability irrigated: 2e
Ecological site name: Deep Hardland 16-21" Pz
Ecological site number: R077CY022TX
Typical vegetation: The natural plant community for this site is short grass dominant with a few midgrasses and forbs. Very few shrubs or woody plants occur on this short grass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant.

Use and Management

Major land uses: These soils are primarily used for cropland. A few areas are used as improved pasture or rangeland.
Cropland: This soil is well suited to cropland. The moderate available water capacity of the soil is a minor limitation. The most common crops grown are cotton and grain sorghum. Other crops include wheat, sunflowers, and forage sorghum. The main concerns in management are conserving soil moisture and controlling soil erosion. Fertilizer applications, reduced tillage, high-residue cover crops, and crop residue management can help reduce the soil temperature, conserve moisture, and improve or maintain soil tilth and productivity. Terraces, contour farming, grassed waterways, and diversion terraces, where needed, can help control runoff and water erosion. Improved varieties of bermudagrass and bluestems are the major pasture grasses grown on these soils. Fertilizer applications, weed control, brush management, proper stocking rates, and controlled grazing can help conserve soil moisture and improve or maintain productivity.
Rangeland: This soil is moderately suited to rangeland. Native plants are dominantly shortgrasses, which produce moderate amounts of forage. The main concerns in management are continuous overgrazing, fire suppression, invasion of woody species, and early successional annual grasses and annual forbs. Proper stocking rates, brush management, and controlled grazing can help improve or maintain productivity.
Urban Development: This soil is moderately suited to urban uses. It is very limited as a site for the construction of roads and streets, lawns and landscaping, or use as road-fill material and daily cover for landfills. The low soil strength and high carbonate content are major limitations. Because of low soil strength, special treatment is necessary to increase the stability of road sub-grades. Pipelines, storage tanks, and other underground structures made of uncoated steel should be protected from the high corrosion potential of these soils. This can be overcome by providing cathodic protection or by using galvanized steel.
Recreational Development: This soil is moderately suited to most recreational uses. It is very limited as a site for golf fairways. The high carbonate content of the soil is a major limitation. Other recreational use is somewhat limited because of dustiness. Applications of water or special surfacing material may be needed during dry periods to prevent excessive dustiness in areas that are subject to heavy foot traffic.
Wildlife Habitat: The moderately arid conditions, which can limit plant growth necessary for good habitat, are a minor limitation.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 140,937 acres in the survey area, or about 24 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the eastern part. About 135,000 acres of this prime farmland is used for crops. The crops grown on this land, mainly cotton and grain sorghum, account for an estimated one-third of the county's total agricultural income each year.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed at the end of this section. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

The map units that meet the requirements for prime farmland are:

- AcA—Acuff loam, 0 to 1 percent slopes
- AcB—Acuff loam, 1 to 3 percent slopes
- BcA—Bippus clay loam, 0 to 2 percent slopes, occasionally flooded (Prime farmland if protected from flooding or not frequently flooded during the growing season)
- EsA—Estacado loam, 0 to 1 percent slopes
- FrA—Friona loam, 0 to 1 percent slopes (Prime farmland if irrigated)
- LoA—Lofton clay loam, 0 to 1 percent slopes
- OcA—Olton clay loam, 0 to 1 percent slopes
- ZmA—Zita loam, 0 to 1 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, slightly limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately well suited, poorly suited*, and *unsuited* or as *good, fair*, and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, and the system of land capability classification used by the Natural Resources Conservation Service is also explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Texas AgriLife Extension Service.

Management of Cropland

About 466,782 acres in the county is in cropland. About 157,734 acres is irrigated each year. The rest of the cropland is nonirrigated.

The major nonirrigated crops include cotton, grain sorghum, wheat, sunflowers, and forage sorghum. The major irrigated crops are also cotton and grain sorghum, and, in addition, a few areas of peanuts and soybeans. Cotton is the most important of the cash crops grown in irrigated areas. In the sandier locations of Hockley County, peanuts are also an important irrigated cash crop.

Irrigation water is drawn from wells in the Ogallala Aquifer. Surface and sprinkler irrigation systems are used. Most of the surface systems are on nearly level cropland areas and are used less commonly than sprinkler systems.

Sprinkler systems throughout the county include center-pivot systems and lateral move systems. Center pivot systems are the most common (fig. 2).

Irrigation water management is important because of the high cost of pumping water and the need to conserve the water in the Ogallala Aquifer. Irrigation water should be applied at the proper times and in the amounts required by the crop. The timing of irrigation can be determined by the feel and appearance method; by moisture monitoring devices, such as gypsum blocks and tensiometers; and by the moisture accounting method. Crop needs for various growth stages can be determined from consumptive use curves.

Figure 2.—Center-pivot irrigation system on peanuts.

Irrigation water should be distributed evenly to all parts of the field. Annual or biennial evaluations of surface and sprinkler irrigation systems are recommended in order to locate inefficiencies in distribution. Where surface systems are used, land leveling, land grading, shortening of irrigation runs, surge irrigation systems, and cutback head irrigation systems can increase the efficiency of water distribution. Replacing worn nozzles can increase the efficiency of sprinkler systems. In addition, operating the systems at the pressures recommended by manufacturers or distributors can ensure a high degree of efficiency.

In all areas of cropland, soil and water conservation are important management concerns. Crop residue management and other measures, such as furrow diking, contour stripcropping, field stripcropping, wind stripcropping, cover cropping, contour farming, and terracing, help to control wind erosion and water erosion, conserve moisture, and maintain or improve tilth. Measures that conserve moisture generally result in higher crop yields.

Crop residue management includes crop residue use, delayed seedbed preparation, and conservation tillage. Leaving crop residue on the surface helps to protect the soil against wind erosion; minimizes soil crusting and the detachment of soil particles, and thus helps to control runoff and water erosion; reduces the rate at which soil moisture evaporates; improves tilth in the surface layer; and minimizes compaction by farm machinery.

Tillage should be sufficient to prepare a good seedbed and to control weeds without damaging the structure of the soil. Heavy traffic on the soil, especially during wet periods, can cause the formation of a compaction pan by destroying soil structure. Compaction reduces soil porosity and restricts root growth into and through the compacted layer. It limits the ability of the root system of a crop to take up moisture and nutrients. It also increases the amount of moisture and nutrients lost through runoff and erosion. Deep chiseling and controlled traffic patterns can minimize compaction. Roughening the surface through emergency tillage helps to control wind erosion.

Properly applied fertilizer is needed on all cultivated soils. Soil analysis and knowledge of the history of fertilizer application on a field can help in making accurate estimates of the kind and amount of nutrients needed to produce a specific yield. An annual soil analysis can detect a buildup or depletion of required nutrients for each crop. In addition, plant analyses can be used to determine nutrient deficiencies in a growing crop.

Management of Pasture and Hayland

Pasture and hayland make up about 2,000 acres in the county. All 2,000 acres is irrigated each year.

Management of pasture and hayland includes selecting plants that are suited to the soil, applying fertilizer, managing grazing heights for maximum productivity, rotating pastures, and controlling weeds and brush. Efficient water management is important in areas where pasture or hayland is irrigated.

Many highly productive grasses are suitable for improved pasture. The most widely used grasses are kleingrass and improved bermudagrass. Improved bermudagrasses are the most widely grown grasses in areas of irrigated pasture.

Applying fertilizer or planting soil-improving leguminous crops is essential for economical forage production in areas of irrigated pasture and hay. In areas of nonirrigated pasture, fertilizer should be applied when the moisture supply is adequate. All fertilizer should be applied according to the results of soil or plant analysis.

Rotating pastures for proper grazing use is an important management practice. Timely rotation allows for the maximum production of improved grasses. Weeds can be controlled by mowing, by prescribed burning, or by applying approved herbicides.

Management of Orchards and Vineyards

About 100 acres in the county is used for orchards and vineyards. Grapes and pecans are the major crops. A number of soils in the county are well suited to irrigated orchard crops. Most of the soils used for irrigated row crops are suited to orchard crops.

The management measures needed in orchards are similar to those needed in areas of other irrigated crops. They include proper tillage, management of crop residue, use of cover crops, applications of fertilizer, timely disease and insect control, weed control, and management of irrigation water.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Texas AgriLife Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system *(15)*, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s*, or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the table 5.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Table 6, table 7, and table 8 show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store

it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are generally favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings in the tables are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass,

primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock, or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Large Animal Carcass Disposal

Table 9 shows the degree and kind of limitations that affect the disposal of large animal carcasses by the pit or trench method. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected of a properly designed and installed system. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of the individual limitations. The ratings are shown in decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Large animal disposal, pit and large animal disposal, trench, are methods of disposing of dead animals by placing the carcasses in successive layers in an excavated pit or trench. The soil is evaluated from the surface to a depth of 79 inches. Onsite investigation to a greater depth will be needed for final site acceptance. The ratings are based on the soil properties that affect attenuation of suspended, soil solution, and gaseous decomposition products and microorganisms; construction and maintenance of the site; and public health. Improper site selection, design, or installation may cause contamination of ground water, seepage, and contamination of stream systems from surface drainage or floodwater.

The soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations. Pollution is a hazard on soils that are subject to flooding or have a water table within the depth of excavation. These soils cannot be easily excavated. Soils that have high saturated hydraulic conductivity (K-sat) or are shallow to bedrock, ice, a cemented pan, or stones and boulders are limited because

these features interfere with the installation, performance, and maintenance of the system. Slope affects road construction, performance of the roads, and the control of surface water around the trench. Also, it can cause difficulty in construction where the trench or pit bottom must be kept level and oriented to follow the contour of the land.

The ease with which the trench or pit is dug and with which a soil can be used as daily and final cover is based largely on soil texture and consistence, which affect workability both when the soil is dry and when it is wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and difficult to place as a uniformly thick cover over a layer of carcasses. The uppermost part of the final cover should be soil material that favors the growth of plants. It should not contain excess sodium or salts and should not be too acid. In comparison with other horizons, the surface layer in most soils has the best workability and the highest content of organic matter. Thus, it may be desirable to stockpile the surface layer for use in the final blanketing of the fill.

Rangeland

J.R. Bell, Rangeland Management Specialist, Amarillo, Texas, prepared this section.

Rangeland is land on which the potential natural vegetation is predominantly grasses, grass like plants, forbs, or shrubs suitable for grazing or browsing. This includes rangelands in their native state and rangelands that may have been restored by the reseeding of native plants and are being managed now as native rangelands. Plant communities on rangelands are closely related to the kind of soils present. In order to understand and to effectively manage rangeland ecosystems, there must be a good understanding of the interaction between soils, plants, grazing animals, and water.

In the detailed map unit descriptions, the potential natural plant community (also referred to as historic climax) that grows on each map unit is described. A potential natural plant community is an association of plants that are best adapted to the environmental factors of soil, topography, and climate present on a particular site. These plants developed over centuries and have reached equilibrium in relation to the other factors. These communities are fairly stable with some minor variations because of yearly growing conditions. The historic climax is not static, but the fluctuations are not drastic. In general, the potential natural plant community in the same major land resource area on the same soil will be very similar.

A term used to characterize distinctive kinds of rangeland is the “ecological site” (sometimes called range site). These “sites” produce different natural plant communities than do other “sites.” There will be differences in species, amounts, and proportions of plants from site to site. There are generally a few major species, which characterize a particular site. These are listed under the map unit descriptions. Not every soil is a different ecological site; similar soils will often be in the same site.

As a part of the preparation of a complete resource inventory, it is useful to know if the plant community has undergone changes over time. Many years of livestock grazing, the absence of natural fires, and invasion of plants not originally present in pristine times, and climatic events such as major droughts have all interacted to effect changes in vegetation on our native rangelands. While some of our rangelands have remained very productive and very similar to what they were two hundred years ago, most of the range has declined from its original potential.

How a range is managed will affect the nature of the vegetation as to production, species composition, plant health, and its potential to protect the soil. If grazing is too severe for an extended period, the vigor of individual plants will decline and overall productive capacity will be reduced. Often the more palatable vegetation receives undue pressure and these species begin to disappear. Less desirable species will fill the void and the appearance of the range changes, as well as its capacity to sustain a certain level of stocking. Strong, perennial species may be replaced by weaker perennials or annual species. Stability is affected and the plant community is unable to withstand the

extreme climatic variations. Opportunistic brushy and weedy plants often make an appearance. Generally, this process takes place gradually over many years, and the degradation process may take more than one pathway. This is because no two sites are going to respond exactly the same way. Site resilience is different and climatic factors influence the process in ways difficult to predict. Soil deterioration may be accelerated as the plant community declines in stability and in its ability to protect the soil surface. Erosion is increased, lowering productivity even more.

However, many degraded rangelands can be restored through good grazing management practices alone. Prescribed grazing, that is, using an appropriate stocking rate of animals for a specific time period followed by a recovery period or “rest,” is the most needed practice on all native rangelands. The sequence of graze-rest may need adjusting from year to year. In addition, stocking rates need to remain flexible since production of the range is variable. There are other practices used to sustain or improve rangeland productivity. The more common ones are: brush management where woody plants have increased to problem densities and are threatening the overall balance of the site; livestock watering systems to better distribute grazing or browsing; cross–fencing to more efficiently graze larger units of rangeland; and rangeland re-seeding where natural plant communities have deteriorated and an insufficient seed source remains. All these practices should be applied as a part of an overall resource management plan. The planning process consists of planning, monitoring, and re-planning constantly on a year to year basis.

In areas that have similar climate and topography, differences in the kind and amount of rangeland vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 10 shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, and unfavorable years. An explanation of the column headings in the table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are available on line at http://esis.sc.egov.usda.gov/ or in the local offices of the Natural Resources Conservation Service.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Importance of Rangeland

The rangeland livestock industry is very important to West Texas agriculture. Native rangelands serve as the foundation of the industry. Not only do rangelands support livestock grazing; they also provide valuable wildlife habitat, recreational opportunities,

and watersheds for our lakes, rivers, and streams. This survey area contains about 581,556 acres of which 13.6 percent or 78,965 acres are range or other grazing lands. The size of range units varies from small to very large. Both cow-calf and stocker operations are common. The region, including the Texas Panhandle and South Plains, is part of the largest cattle feeding area in the United States. Locally grown grain crops help sustain this industry, enhancing the area's cropland-agriculture enterprises. Many stocker cattle are pastured on small grain during fall and winter months and are then put in feedlots or grass pasture.

The climate of the region is generally well suited to ranching. In the winter months, cold fronts are frequent in which temperatures drop into the teens or occasionally lower. These fronts may bring snow and ice; however, these periods do not last long. Feeding of hay and supplement in the winter months is necessary. The common supplementation is protein in the form of cottonseed cake or grain cubes. Mineral blocks are often left out year-round. There is little cool-season grass production, and most of the production on the native rangeland occurs from May through October.

A typical growth curve for native vegetation representing the percentage of total growth occurring each month would be:

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	2	3	7	20	30	15	5	10	4	2	1

Ecological Sites

The county has 11 ecological sites. These are Deep Hardland, Draw, Hardland Slopes, High Lime, Limy Upland, Playa, Sand Hills, Sandy, Sandy Loam, Very Shallow, and Wet Saline.

Deep Hardland ecological site. The Acuff, Estacado, Friona, Lofton, Olton, and Zita soils in map units AcA, AcB, EsA, FrA, LoA, OcA, and ZmA are in this site (fig. 3).

Figure 3.—Deep Hardland ecological site in an area of Acuff loam, 0 to 1 percent slopes.

The composition, by weight, is about 88 percent grasses, 8 percent forbs, and 2 percent cryptogams, and 2 percent shrubs.

The natural plant community for this site is dominated by short grasses with few midgrasses and forbs. Almost no shrubs or woody plants occur. It is a shortgrass prairie. The most prevalent grasses are blue grama and buffalograss with blue grama being dominant. In excellent condition, the short grasses make up 65 to 80 percent of the total plant community. The midgrass component will be less than 20 percent of the total and will consist mainly of western wheatgrass or vine mesquite. On the more loamy soils of this site, sideoats grama will likely also occur. Other species will occur in smaller amounts, and will together comprise 10 percent or less of the total production. These are sand dropseed, tumble windmillgrass, sand muhly, silver bluestem, tobosagrass, and galleta. Forbs are moisture dependent and are most abundant in above-average rainfall years. The forbs will make up 5 percent or less of total production.

Under heavy grazing, sideoats grama, western wheatgrass, and vine mesquite will decline and will eventually disappear from the site. The blue grama will take on a sod-bound appearance to escape grazing pressure. Buffalograss will increase and a generally low vigor-low production situation will prevail. Eventually with prolonged abuse the site will deteriorate to stunted buffalograss, perennial threeawn, sand muhly, sand dropseed, and a variety of weedy grasses and annual forbs.

Draw ecological site. Bippus and Levelland soils in map units BcA and LDA are in this site. The composition, by weight, is about 90 percent grasses, 5 percent forbs, 1 percent cryptogams, and 4 percent shrubs.

The natural plant community is dominantly midgrasses with lesser amounts of both tall and shortgrass species. A few forbs occur along with a few woody plants. These sites catch runoff from surrounding shortgrass sites. The dominant species are western wheatgrass, vine mesquite, and sideoats grama. Blue grama and buffalograss always make up the most of the shortgrass complement. In general, midgrasses make up 50 percent of the total herbage with shortgrasses making up from 15 to 25 percent. In instances where soil and moisture conditions are more favorable, tall grasses will be found such as switchgrass and Indiangrass. These are usually less than 15 percent of the total site composition. There are a few forbs present but they tend to be obscured by the thick grass growth. Shrubs and trees are relatively few and occur intermittently.

Under heavy grazing, tall grass species disappear and the western wheatgrass and vine mesquite eventually give way to increased amounts of blue grama and buffalograss. Continued abuse will finally lead to a short grass dominated site with weedy invasion and low vigor production. Prickly pear will often invade along with mesquite and other undesirable woody plants if seed sources are present.

Hardland Slopes ecological site. Berda and Creta soils in map units BeC, BpD, and CtC are in this site.

The composition, by weight, is about 81 percent grasses, 8 percent forbs, 3 percent cryptogams, and 8 percent shrubs (fig. 4).

This is a transitional site dominated by shortgrass with a significant midgrass component. Blue grama is the dominant grass making up 50 percent or more of the total production. Buffalograss and sideoats grama is next in importance. Other midgrasses are vine mesquite and western wheatgrass that occur in microlows where moisture collects. This site is very productive if runoff can be minimized. When heavily grazed, cover is not sufficient to retard runoff and the slopes carry it away rapidly. Yucca is the principal woody plant with relatively few forbs being present. This site is subject to gully erosion when cover is poor.

Under heavy grazing, on a sustained basis, this site will become completely dominated by short grasses. This will result in a sod-bound blue grama and buffalograss condition. In later stages of degradation an invasion of weedy species such as broom snakeweed and annual grasses such as little barley occurs. Prickly pear may also invade along with mesquite in certain locations where a seed source is available.

Figure 4.—Hardland Slopes ecological site in an area of Berda loam,3 to 5 percent slopes.

High Lime ecological site. Arch and Drake soils in map units ArA, DRC, and DRE are in this site (fig. 5).

The composition, by weight, is about 84 percent grasses, 5 percent forbs, and 1 percent cryptogams, and 10 percent shrubs.

Figure 5.—High Lime ecological site with typical area of Drake soils, 1 to 8 percent slopes.

This is a mid and tall grass site with a lesser short grass complement and a few woody plants. Forbs also occur but are not abundant. Grasses that are tolerant of the limey conditions dominate the site. Sideoats grama, blue grama, vine mesquite, western wheatgrass, and alkali sacaton are the more common species. Fourwing saltbush will often be present and a few cholla plants may also occur on parts of the site. This site is not usually a preferred grazing area because of the high lime content in the soil. Palatability is lower on this site because of the limey soil. If overgrazed, the blue grama and sideoats grama will decrease and alkali sacaton and inland saltgrass will increase. If abused long term, the site will exhibit large patches of bare ground, numerous annuals, and broom snakeweed. Prickly pear and shrubby mesquite may also invade the site if abuse is prolonged.

Limy Upland ecological site. Midessa, Pep, Portales, and Posey soils in map units MdA, MdB, MPC, PeA, PeB, PoA, PoB, PsA, PsB, and PsC are in this site.

The composition, by weight, is about 81 percent grasses, 8 percent forbs, 3 percent cryptogams, and 8 percent shrubs.

The natural plant community for this site is dominantly shortgrass and midgrass and only a few woody species. It resembles a clay loam site except for the presence of more midgrasses such as sideoats grama, western wheatgrass, and vine mesquite. The dominant grass is generally blue grama. The site typifies a shortgrass and midgrass prairie. Short grasses make up 60 percent or more of the grass complement with midgrasses making up 20 to 25 percent. Forbs will comprise as much as 8 percent of the total community and shrubs will make up about 5 percent.

Under heavy grazing, the midgrasses will decline and eventually disappear. Blue grama will become more sod-bound and buffalograss will increase. Production will decline dramatically with continued abuse and low-vigor plants will result.

Playa ecological site. Chapel, Ranco, and Sparenberg soils in map units ChA, RcA, and SpA are in this site.

The composition, by weight, is about 49 percent grasses, 50 percent forbs, and 1 percent shrubs.

The natural plant community is highly variable depending on the hydrology of the playa. There is usually a mixture of hydrophytic plants and upland plants but this depends on the degree and frequency of inundation. The larger, deeper playa basins that receive more runoff are usually inundated for longer periods and are dominated by hydrophytic plants such as rushes, spike sedges, spike rushes, smartweed, arrowhead, and curly dock. The small, shallow playas and areas adjacent to the deeper playa basins may be dominantly grass vegetation such as western wheatgrass, vine mesquite, and buffalograss with a few forbs such as asters, coreopsis, bur ragweed, lambs quarters, and annual forbs. The degree of diversity is highly variable from one playa to another. It is difficult to describe a true climax community as the periods of inundation vary in frequency and longevity, and this site is in a constant state of change. This site has very few shrubs, and these generally occur around the periphery of the wetter playa basins. If playas are inundated through the growing season and then are dry in the fall and bare during the following winter and early spring; they are then subject to wind erosion until plants emerge in the summer.

Under heavy grazing, the more productive grasses and grass-like species will decrease and bursage, blueweed and other unpalatable species will increase. Smartweed is quite palatable and may decrease if heavy grazing persists. Normally the amount and frequency of inundation affects the plant community more than grazing.

Sand Hills ecological site. Nutivoli soils in map unit NtC are in this site.

The composition by weight is 55 percent grasses, 35 percent shrubs, and 10 percent forbs.

The natural plant community is dominated by tallgrasses, which include sand bluestem, giant sand reed, little bluestem, and the taller dropseed species. Lesser amounts of switchgrass and Indiangrass are also found under favorable moisture

conditions. The major shrubs are sand shinoak, sand sagebrush, and skunkbush sumac. Lesser amounts of sand plum and southwestern rabbit brush are found. The amount of forbs varies greatly from year to year. Common forbs are queen's delight, gaura, and annual wild buckwheat.

Under heavy grazing, the tall grasses decline and midgrass species increase. The shrub components increase dramatically to greater than 60 percent. There is a marked increase in western ragweed, dropseed species, and perennial threeawns. If abuse is prolonged, shrubs will become dominant with mainly annual forbs and grasses present. Yucca will increase and bare areas along with wind erosion will increase.

Sandy ecological site. Amarillo, Patricia, and Tokio soils in map units PAB and TkB are in this site.

The composition, by weight, is about 60 percent grasses, 12 percent forbs, and 28 percent shrubs (fig 6).

This is a tall grass climax. Nearly half of the grass component is composed of tall grasses such as little and sand bluestem along with taller dropseed species. The remainder of grass vegetation is mid and short grasses such as sideoats grama, sand dropseed, hooded windmillgrass, sand lovegrass, sand paspalum, fall witchgrass, hairy grama, needle and thread, and perennial threeawn. Forbs make up from 8 to 12 percent of the total herbaceous vegetation. Woody shrubs, namely sand sage, shinnery oak, and skunkbush, make up 20 to 30 percent of the plant community.

Under heavy grazing, the tall grass species decline with brush and midgrasses filling the void. With further abuse, weedy species such as western ragweed, camphorweed, and annuals make up more than half of the yearly production. In some cases the sand sagebrush, shinnery oak, and skunkbush can form more than a 50 percent canopy.

Figure 6.—Typical area of Sand Hills ecological site.

Sandy Loam ecological site. The Amarillo, Arvana, Seagraves, and Tokio soils in map units AfA, AfB, AfC, AvA, AvB, SgA, and TkA are in this site.

The composition, by weight, is about 83 percent grasses, 8 percent forbs, 2 percent cryptogams, and 7 percent shrubs.

The natural plant community is a mixture of short and midgrasses with a smaller tall grass complement. Midgrasses tend to dominate over most of the site with sideoats grama being the dominant midgrass. Little bluestem is the dominant tall grass species. Small areas occur within the site where blue grama may be dominant. Forbs make up 5 percent or less of total production. Shrubs are few with yucca, catclaw, and sand sage occurring in amounts of 5 percent or less.

Under heavy grazing, the tall and midgrasses decline and the shorter grasses increase. If abuse is prolonged it will revert to a short grass dominated site. Blue grama acts as a strong increaser under heavy grazing. Further degradation will allow an invasion of threeawns and annuals. Sand sagebrush and yucca will usually increase.

Very Shallow ecological site. Kimberson, Potter, Sharvana, and Yellowhouse soils in map units BpD, KmB, PGE, ShB, and YhE are in this site (fig. 7).

The composition, by weight, is about 80 percent grasses, 10 percent forbs, 2 percent cryptogams, and 8 percent shrubs.

The natural plant community is a mixture of short and midgrasses with a few tall grasses. A moderate amount of forbs and shrubs are also present. Major grass species are sideoats grama, little bluestem, hairy grama, blue grama, slim tridens, and buffalograss. The major forbs include black samson, dotted gayfeather, catclaw sensitivebriar, and annual forbs. Yucca, catclaw acacia, and feather dalea are the major woody species along with ephedra and skunkbush. Vegetation is somewhat sparse except in higher moisture areas. Soil depth limits density. Large areas of bare ground are common. The limey nature of the soil further narrows the species occupying the site. This is not a preferred site by livestock. Production is low and palatability of forage is less than on sites with stronger soil resources.

Figure 7.—Very Shallow ecological site with typical area of Potter soils, 3 to 20 percent slopes.

Under heavy grazing, the more palatable grasses are reduced and bare ground increases. When cover is reduced, the danger of erosion increases. If the climax grasses and forbs are removed from this site, it will revert to broom snakeweed, threeawns, and annuals.

Wet Saline ecological site. Lenorah and Yellowlake soils in map units LeA and YeA are in this site (fig. 8).

The composition, by weight, is about 80 percent grasses, 10 percent forbs, and 10 percent shrubs.

The natural plant community for this site is a mixture of salt-tolerant grasses and grass-like plants, forbs, and shrubs. This site is characterized by a high water table that historically did not exist until recent years, so the natural plant community is still in a state of development. At this time, it is not known if the present high water table and saline conditions will remain over an extended period of time. It is assumed that they will and that the plant community that has been established will remain with some minor fluctuations due mainly to the degree of salinity and the hydrology. The vegetation on most of the site is a shrub dominant type with saltcedar (tamarix) and baccharis being the two most prevalent species. In open areas and in the understory there are varying amounts of alkali sacaton, Texas dropseed, creeping muhly, jointtail, sedge and rushes, inland saltgrass, and occasionally some western wheatgrass. Forbs include kochia, smartweed, dock, and annual forbs. Occasionally a few willows and cottonwoods are present. In areas where the water table is nearer the soil surface and in standing water, cattails may be present. Sedges, rushes, and cattails may dominate low depressions. In extremely saline areas, vegetation is sparse.

Figure 8.—Typical area of the Wet Saline ecological site.

Windbreaks and Environmental Plantings

Charles Coffman, Wildlife Biologist, Natural Resources Conservation Service, Lubbock, Texas, prepared this section.

Windbreaks protect livestock, buildings, roads, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Living snow fences are plantings of mostly evergreen species that protect against drifting snow on private and public roads. Livestock protection plantings are generally narrow evergreen plantings that are shaped to provide protection from harsh winter conditions.

Environmental plantings (farmstead windbreaks) help to beautify and screen houses and other buildings, abate noise, and reduce wind. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well-prepared site and maintained in good condition.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. These estimates are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service, Texas Forest Service, or of the Texas AgriLife Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 12 and table 13 according to limitations that affect their suitability for recreation. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In

planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in the tables can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf course fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper

40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Wildlife Habitat

Charles Coffman, Wildlife Biologist, Natural Resources Conservation Service, Lubbock, Texas, prepared this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining and manipulating the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 14, table 15, and table 16 the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. The degree and kind of soil limitation are given for grain and seed crop for food and cover; domestic grasses and legumes for food and cover; upland wild herbaceous plants; upland shrubs and vines; and freshwater wetland plants. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect wildlife habitat. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The elements of wildlife habitat are described in the following paragraphs.

Ratings for *grain and seed crops* for wildlife use as food and cover provide guidelines in the selection of sites that reflect soil properties and plant species necessary to sustain wildlife habitat and not to reflect commercial agronomic production. Soil properties and features that affect the growth of grain and seed crops are soil texture, organic mater content, the amount of rock fragments on or near the soil surface, available water capacity, depth to bedrock or pan, soil moisture and temperature regime, depth to high water table, soil moisture and temperature regime, ponding and flooding, permeability into the soil surface, slope, presence of excess salts, susceptibility of the soil surface to water and wind erosion. Examples of grain and seed crops are corn, wheat, oats, grain sorghum, and millet.

Ratings for *domestic grasses and legumes* for use as wildlife food and cover provide guidelines in the selection of sites that reflect soil properties and plant species necessary to sustain wildlife habitat and not to reflect commercial agronomic production. Soil

properties and features that affect the growth of grasses and legumes are soil texture, organic mater content, the amount of rock fragments on or near the soil surface, available water capacity, depth to bedrock or pan, soil moisture and temperature regime, depth to high water table, soil moisture and temperature regime, ponding and flooding, permeability into the soil surface, slope, presence of excess salts, susceptibility of the soil surface to water and wind erosion. Examples of grasses and legumes are old world bluestem, lovegrass, kleingrass, clover, alfalfa, and Illinois bundleflower.

Ratings for *upland wild herbaceous plants* provide guidelines for determining soil quality as a medium for growing a diverse upland herbaceous plant community which is adapted to soil conditions that are drier than those common in the moist riparian and wetland zones but that are not s dry as in the upland desert areas. Soil properties and features that affect the ability of these species to thrive include soil texture, available water capacity, the presence of excess salts in the soil, soil moisture and temperature regimes, depth to high water table, the presence of rock fragments at the soil surface. Examples of upland wild herbaceous plants are little bluestem, switchgrass, western ragweed, croton and sideoats grama.

Ratings for *upland shrubs and vines* provide guidelines for determining soil quality as a medium for growing a diverse upland shrub and vine community which is adapted to soil conditions that are drier than those common in the moist riparian and wetland zones but that are not as dry as those in the upland desert area. Soil properties and features that affect the ability of these species to thrive include soil texture, soil organic matter, available water capacity, depth to bedrock or pan, the presence of excess salts in the soil, soil temperature and moisture regime, depth to high water table, and the presence of rock fragments at the soil surface. Examples of upland shrubs and vines are four-wing saltbush, shinnery oak, and flameleaf sumac.

Ratings for *freshwater wetland plants* provide guidelines for determining soil quality as a medium for growing plants which are adapted to wet soil conditions. The soils suitable for this habitat generally occur along marshes, depressions, bottom lands, backwater areas of flood plains, drainages adjacent to streams, springs and seeps or any other landscape position that are not directly affected by moving floodwaters but may have ponded water in some parts of the year. The soil properties and features that affect the ability of freshwater wetland plants to persist include soil texture, soil organic matter content, depth to high water table, ponding, the presence of excess salts in the soil, and soil reaction (pH). Examples of freshwater wetland plants are smartweed, saltgrass, bulrush, knotgrass, cattail, rushes, and sedges.

Hydric Soils

In this section, hydric soils are defined and described.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology *(20,23,22, 21)*. Criteria for each of the characteristics must be met for areas to be identified as wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part *(19)*. These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established *(26)*. The criteria are used to identify a phase of a soil series that normally is also a hydric soil. The criteria used are selected

estimated soil properties that are described in "Soil Taxonomy" *(14)* and "Keys to Soil Taxonomy" *(13)* and in the "Soil Survey Manual" *(18)*.

If soils are wet enough for a long enough period to be considered hydric, they generally exhibit certain properties that can be observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" *(24)*.

Additional information on hydric soils is available in the local office of the Natural Resources Conservation Service or on line at http://soildatamart.nrcs.usda.gov/.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 17 and table 18 show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are

depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Table 19 and table 20 show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not

adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include

flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Table 21 and table 22 show information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

The soils are rated as a *probable* or *improbable* source of sand and gravel. A rating of *probable* means that the source material is likely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. The number 0.00 indicates that the soil is an improbable source. A number between 0.00 and 1.00 indicates the degree to which the soil is a probable source of sand or gravel.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 21, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the

material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 23, table 24, table 25, and table 26 provide information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; aquifer-fed excavated ponds; constructing grassed waterways and surface drains; constructing terraces and diversions; and tile drains and underground outlets. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is

determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Constructing grassed waterways and surface drains. Grassed waterways and surface drains are natural or constructed channels, generally broad and shallow, that permit otherwise restricted infiltration to occur and will conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Constructing terraces and diversions. Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Tile drains and underground outlets. Tile drains and underground outlets require installation of subterranean plumbing or other outlet devices that would allow proper drainage of excess water within the soil which might otherwise cause management problems, such as buildup of salts from evaporation or a shallow water table. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect installation of tile drains and underground outlets. A restricted rooting depth, toxic substances such as salts and sodium, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Soil interpretations for *irrigation all application methods* evaluate a soil's limitation(s) for irrigation practices. The ratings are for soils in their natural condition and do not consider present land use. The irrigation interpretations are not designed or intended to be used in a regulatory manner.

Irrigation practices are used to provide supplemental water to crops, orchards, vineyards, and vegetables in areas where natural precipitation will not support the production of the crops being grown.

The soil properties and qualities important in design and management of an irrigation practice are sodium adsorption ratio, depth to a seasonal high water table, available water capacity, air and water permeability, wind erodibility, erosion factor, slope, and flooding. The soil properties and qualities that influence installation and tillage are stones, depth to bedrock or cemented pan, and depth to a seasonal high water table. The properties and qualities that affect performance of the irrigation system are depth to bedrock or cemented pan, bulk density, the sodium adsorption ratio, salinity, and soil reaction.

Soil interpretations for sprinkler irrigation evaluate a soil's limitation(s) for sprinkler irrigation systems. The ratings are for soils in their natural condition and do not consider present land use. The irrigation interpretations are not designed or intended to be used in a regulatory manner.

Sprinkler irrigation systems apply irrigation water to a crop through a series of pipes and nozzles and can be either solid set or mobile. Generally, this type of irrigation system is suitable for small grains, row crops, vegetables, and orchards.

The soil properties and qualities important in the design and management of sprinkler irrigation systems are depth, available water holding capacity, sodium adsorption ratio, surface coarse fragments, air and water permeability, salinity, slope, wetness, and flooding. The features that affect performance of the system and plant growth are surface texture and rocks, salinity, sodium adsorption ratio, wetness, erosion potential, and available water holding capacity.

Soil interpretations for drip or trickle irrigation evaluate a soil's limitation(s) for surface drip irrigation of crops. This type of irrigation system applies water at a very slow rate near the plants. The ratings are for soils in their natural condition and do not consider present land use. The irrigation interpretations are not designed or intended to be used in a regulatory manner.

Drip or trickle irrigation systems are irrigation systems that supply water to the plant very slowly. Generally, drip irrigation systems are very efficient irrigation technologies in terms of both water and energy use and are suitable for use in some crops.

The soil properties and qualities important in the design and management of drip irrigation systems are depth, wetness, ponding, internal drainage, and flooding. The soil properties and qualities that influence installation are depth, flooding, and ponding. The features that affect performance of the system and plant growth are the amount of salts, lime, gypsum, or sodium.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Soil Properties

Table 27 provides the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1998) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1998).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the

poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 28.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Soil Properties

Table 28 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk

density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K-sat) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K-sat). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 29, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 29 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Soil Properties

Table 29 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a

soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

Table 30 provides estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep and very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely gray colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency of ponding*. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent

in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 31 provides estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth* to top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action.

Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 32 and the results of chemical analysis in table 33. The results of clay mineralogy analysis are in table 34. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. Unless noted, they are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(25)*.

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all material less than 75 mm (3B1).

Coarse materials—(2-250 mm fraction) volume estimates of the percentages of all material greater than 2 mm (3B2).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).

Water retained—pressure extraction, percentage of ovendry weight of less than 2 mm material; 1/3 or 1/10 bar (4B1), 15 bars (4B2).

Water-retention difference—between 1/3 bar and 15 bars for whole soil (4C1).

Bulk density—of less than 2 mm material, saran-coated clods field moist (4A1a), 1/3 bar (4A1d), ovendry (4A1h).

Linear extensibility—change in clod dimension based on whole soil (4D).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Organic carbon—dry combustion (6A2d).

Extractable cations—ammonium acetate pH 7.0, ICP; calcium (6N2i), magnesium (6O2h), sodium (6P2f), potassium (6Q2f).

Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Reaction (pH)—1:1 water dilution (8C1f).

Carbonate as calcium carbonate—(fraction less than 2 mm [80 mesh]) manometric (6E1h).
Electrical conductivity—saturation extract (8A3a).
Sodium adsorption ratio (5E).
Clay mineralogy (7a2i).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(13,14)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 35 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustalf (*Ust*, meaning burnt, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Paleustalfs (*Pale*, meaning old development, plus *ustalf*, the suborder of the Alfisols that has a ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aridic* identifies the subgroup that typifies the great group. An example is Aridic Paleustalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, thermic Aridic Paleustalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

The Official Soil Series Description, including the range of important characteristics of the soils for the series in this survey area, are available at the local Natural Resources Conservation Service office or online at http://soils.usda.gov/technical/classification/osd/. The "survey area" as defined is part of a Major Land Resource Area (MLRA). Major Land Resource Areas are geographically associated land resource units. The dominant physical characteristics of an MLRA are land use, elevation and topography, climate,

water, soils, and potential natural vegetation. The boundaries of Hockley County lie within the Southern High Plains, Southern Part, MLRA-77C.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil that is typical of the series is described. Most of the Official Series Descriptions are not exclusively located within the boundaries of Hockley County but are located in the MLRA survey area of which Hockley County is a part.

The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(18)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(14)* and in "Keys to Soil Taxonomy" *(13)*. Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

It should be noted that the surface texture or another soil property described in the Official Series Description of a soil may not be the same as that found in the typical profile of the detailed soil map unit. However, the typical profile falls within the range of characteristics of the soil series. All soil interpretations in the Hockley County soil survey are based on the typical profile description of the detailed soil map unit in Hockley County.

The following is a list of all the soil series in Hockley County:

- Acuff series
- Amarillo series
- Arch series
- Arvana series
- Berda series
- Bippus series
- Chapel series
- Creta series
- Drake series
- Estacado series
- Friona series
- Kimberson series
- Lenorah series
- Levelland series
- Lofton series
- Midessa series
- Nutivoli series
- Olton series
- Patricia series
- Pep series
- Portales series
- Posey series
- Potter series
- Ranco series
- Seagraves series
- Sharvana series
- Sparenberg series
- Tokio series
- Yellowhouse series
- Yellowlake series
- Zita series

Formation of the Soils

In this section, the factors of soil formation, which have affected the soils of Hockley County, are discussed.

Factors of Soil Formation

Soils are three-dimensional bodies on the Earth's surface, which are capable of supporting plants. Soil properties result from the parent material and from additions, removals, transfers, and transformations to the soil caused by climate, living organisms, topography, and time. Human activities may also be important.

The interaction of the five soil-forming factors results in differences among the soils. Climate and living organisms (plants and animals) are the active factors. They act on the parent material by influencing the weathering of rocks and through subsequent transportation of the material by water and wind. They slowly change the parent material into a natural body with genetically related horizons. The effects of climate and living organisms are influenced by the topography. Soils on flood plains, for example, are quite different from those on well-drained plains. The parent material also affects the kind of profile that can form and sometimes determines it almost entirely. Finally, time is needed to change parent material into soil. Generally, thousands of years are needed for distinct horizons to form.

Climate

Hockley County has a steppe climate and mild winters. The average rainfall is about 19 inches, but the amount varies greatly from year to year. The climate is uniform throughout the county, but its effects on soils have been modified locally by relief and runoff, and the differences generally are not measurably affected by climate.

Because rainfall is low and there are long dry periods, soil development has been slow. Soils are seldom wet below the root zone, and consequently, most of the soils have a horizon of calcium carbonate accumulation. In Acuff, Amarillo, and Olton soils, the carbonates are leached from the surface and upper subsoil layers. Most soils have the layer of calcium carbonate, or caliche, at a depth of 24 to 60 inches. In Arch, Midessa, Pep, and Posey soils free calcium carbonate is present throughout the profile. In sandier soils such as Nutivoli or Patricia and soils in water receiving landscape positions, such as Bippus, Levelland, and Ranco, usually the carbonates have been leached to below 60 inches.

Winds have played an important role in the development of the soils of Hockley County. Most of the parent sediments were deposited by wind during past geologic periods. Even today, high winds remove and deposit soil particles. Winds also are effective in recharging the soils with calcium carbonate as dust particles, thereby keeping the pH of the soils high. Locally, high winds deposited soil materials on the eastern side of some larger playa basins. Drake soils have formed in these deposits.

Warm temperatures have restricted the accumulation of organic matter in most of the soils, although they formed under prairie vegetation. Oxidation tends to accelerate the decomposition of organic matter. Sandy soils, such as Nutivoli and Seagraves are low in organic matter. Lofton, Sparenberg, and Zita are relatively high in organic matter.

Living Organisms

Plants, animals, earthworms, and microorganisms are important in the formation of soils. The type and amount of plant growth is related to the climate, relief, and parent material. The native vegetation in Hockley County is mostly grass; some shrubs and a few small trees are also present. The type of grasses that grow on a particular kind of soil depends partly on the parent material. Short grasses grow on Olton and similar soils that have high clay content. Tall grasses grow on Nutivoli and other sandy soils.

Prairie-type vegetation contributes relatively large amounts of organic matter to soils. Grass leaves and stems fall on the soil surface and decay. Roots decompose and distribute organic matter throughout the profile and provide abundant food for microorganisms. Insect casts and voids formed from decaying plant roots add greatly to the movement of air and water through the profile.

Prairie dogs affect soil development by their burrowing activities. The animals churn and mix the soil material. Krotovinas, or soil-filled animal burrows, are common in the subsoil of most of the soils in the county. Such calcareous soils as Arch, Drake, and Portales have more krotovinas than do most other soils.

Topography

Topography, or lay of the land, influences the formation of soils through its effect on drainage, runoff, and erosion. The topography of Hockley County ranges from nearly level, flat areas to steep, dissected areas.

If other factors of soil formation are equal, the degree of profile development depends largely on the moisture that enters the soil system. Steep soils absorb less moisture and are more susceptible to erosion than soils in more level areas. Therefore, most steep soils have thinner, less developed profiles.

Nearly level to gently sloping soils, such as Acuff, Amarillo, and Olton, permit most of the rainfall to infiltrate; therefore, they are well developed. Berda, Creta, Potter, and Yellowhouse soils are steeper, and runoff and geologic erosion have been high. Therefore, there has only been weak to moderate soil development.

Soils in low, concave areas also show the influence of relief upon their development. Bippus, Lofton, and Zita soils are darker in color and higher in organic matter than soils in higher areas because extra water has produced more vegetation in these low areas. Soils in poorly drained areas, such as Ranco and Sparenberg soils in playas show the influence of excess water on soil development and profile morphology.

Time

Usually thousands of years are required for the formation of distinct horizons in soils. Differences in the length of time that parent material has been in place are generally reflected in the degree of development of the soil profile. The soils in Hockley County range from weakly developed to well developed. The weakly developed soils have little horizon development. Conversely, the well-developed soils have well expressed soil horizons. Berda, Drake, and Nutivoli soils are weakly developed soils as reflected in their weak horizonation. Silicate clay accumulation in the B horizons is not perceptible. Acuff, Amarillo, and Olton soils are well developed. These soils have well-expressed horizons, and silicate clay has been translocated from the surface horizon into the subsoil.

Parent Material

The kind of soil that forms in any given area depends greatly on the kind of parent material in that area. Parent material is the unconsolidated mass from which a soil is formed. It determines the chemical and mineralogical composition of a soil to a considerable extent.

The soils in Hockley County developed mostly in a thick eolian mantle, which comprises the Blackwater Draw Formation of Pleistocene age that blankets most of the county. This mantle was formerly referred to collectively as “cover sands” *(8)*. Acuff, Amarillo, Estacado, Friona, and Olton soils developed in the Blackwater Draw Formation. In areas that have more calcium carbonate or where calcium carbonate is close to the surface the Midessa, Pep, and Posey soils have developed.

Chapel and Sparenberg soils formed in clayey lacustrine deposits of Quaternary age on the floor of playa basins. The Arch, Midessa, and Portales soils formed in calcareous eolian and lacustrine deposits of Quaternary age generally around playas or saline lake basins. On the east and south side of saline lake basins, and many playa basins, a dune of relatively recent material occurs. Drake soils have formed on these Quaternary age dunes. Ancient valleys or floodplains that were once active stream channels now are partially filled by wind-blown deposits in some areas of the county. Lenorah and Levelland soils have formed in these eolian and alluvial deposits of Quaternary age

In northwestern Hockley County around Yellow House Canyon, and along Yellow House Draw, eolian deposits of the Blackwater Draw Formation are very thin. In these areas, part of the Ogallala Formation of Miocene-Pliocene age is exposed *(9)*. The top of the Ogallala Formation is a zone of strongly cemented calcium carbonate (calcrete) commonly known as “Caprock Caliche.” Potter and Kimberson soils have developed in these deposits mainly along the edge of steep escarpments associated with Yellow House Canyon in Hockley County. Below the escarpment on a sloping erosional surface, Berda soils formed in loamy, calcareous deposits from the Ogallala Formation. On the western side of Yellow House Canyon below the Ogallala Formation, a narrow contact of Cretaceous age deposits is exposed at the base of the canyon *(9)*. Creta and Yellowhouse soils formed from these shale and limestone deposits.

Processes of Soil Formation

The soil forming factors produce a succession of layers, or horizons, in the soil profile. The horizons differ in one or more properties, such as thickness, color, texture, structure, consistence, porosity, and reaction.

Most profiles have three major horizons. These are the A, B, and C horizons. Several processes are involved in the formation of these horizons. In Hockley County, the main processes are the leaching of calcium carbonate and other salts and bases, the accumulation of organic matter, and the formation and translocation of silicate clay minerals. In most of the soils, more than one of these processes has been active in the development of the horizons.

The A horizon is the surface layer. It is the horizon that has the maximum accumulation of organic matter. The soils in Hockley County range from low to high in organic matter content. Various dissolved or suspended materials, such as calcium carbonate, organic matter, salt, and clay, may have been translocated out of the A horizon into the B horizon.

The B horizon lies directly below the A horizon. It is the horizon that has the maximum accumulation of materials moved in solution or suspension, or it is an altered horizon with distinct structure. A Bt horizon has a significant accumulation of silicate clay. Acuff, Amarillo, and Olton soils have a Bt horizon. Subsoil layers that

have a distinct structure and little evidence of accumulation of dissolved or suspended materials are designated as Bw horizons. Bippus and Berda soils have a Bw horizon. A Bk horizon has an accumulation of calcium carbonate, which is commonly called caliche. Berda, Drake, and Portales have a Bk horizon. Bkk horizons are pedogenic carbonate accumulation that is characterized by laterally continuous carbonates that have engulfed rock, sand, silt, and clay particles; plugged the macroporosity of the soil horizon with 50 percent or more calcium carbonate; and obliterated the original soil structure. Arch, Midessa, and Zita have a Bkk horizon. A Bkkm horizon indicates continuous or nearly continuous cementation of calcium carbonate that is physically root-restrictive. Arvana, Kimberson, and Sharvana have a Bkkm horizon. Subsoil layers that have slickensides, which are a direct result from the shrinking and swelling of clay minerals and shear failure, commonly at angles of 20 to 60 degrees above horizontal. are designated as Bss horizons. Chapel, Ranco, and Sparenberg soils have Bss horizons.

The C horizon is little affected by soil-forming processes. It consists mainly of unconsolidated deposits or weathered or soft bedrock that can be dug with a spade when moist. Lenorah soils have a C horizon. A Cr layer is weathered or soft bedrock, such as shale, siltstone, sandstone, or weakly cemented bedrock. Creta and Yellowhouse soils have a Cr layer.

References

1. "HOCKLEY COUNTY." The Handbook of Texas Online. Lillian Brasher, Hockley County (2 vols., Canyon, Texas: Staked Plains, 1976). David B. Gracy II, Littlefield Lands (Austin: University of Texas Press, 1968).
2. United States Census Bureau, Census 2000, Hockley County, Texas.
3. United States Department of Agriculture, Soil Conservation Service. 1981. Land resource regions and major land resource areas of the United States. U.S. Dep. Agric. Handb. 296.
4. United States Department of Agriculture, Natural Resources Conservation Service. Resource Data and Concerns, Zone 1, January 2008, Revised 10/2007.
5. 2002 Census of Agriculture, Volume 1 Geographic Area Series, Chapter 2: Texas County Level Data, "Table 1. State Summary Highlights: 2002." Hockley County, Texas. www.nass.usda.gov
6. United States Department of Agriculture. National Water and Climate Center, Portland, Oregon. Climate Station Levelland, Texas.
7. Railroad Commission of Texas News Release—May 29, 2008. Texas Monthly Oil and Gas Statistics.
8. Frye, John C., and A.B. Leonard, 1957b—Studies of Cenozoic geology along eastern margin of Texas High Plains, Armstrong to Howard Counties: Univ. Tex Rept. Inv. 32, Bur. Econ. Geol.
9. anonymous—University of Texas, Bureau of Economic Geology. 1992. Geologic map of Texas.
10. Copyright 2003, Levelland Area Chamber of Commerce.
11. American Association of State Highway and Transportation Officials (AASHTO). 1998. Standard specifications for transportation materials and methods of sampling and testing. 19th edition, 2 volumes.
12. American Society for Testing and Materials (ASTM). 1998. Standard classification of soils for engineering purposes. ASTM Standard D 2487.
13. United States Department of Agriculture, Natural Resources Conservation Service. 1998. Keys to Soil Taxonomy. 8th ed. Soil Surv. Staff, Soil Manage. Support Serv. Tech. Monogr. 19.
14. United States Department of Agriculture, Natural Resources Conservation Service. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd ed. U.S. Dep. Agric. Handb. 436.
15. United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

16. United States Department of Agriculture, Natural Resources Conservation Service. 1995. Soil survey laboratory information manual. Soil Surv. Invest. Rep. 45.

17. United States Department of Agriculture. Soil Survey of Hockley County, Texas. 70 pp., illus., (1959).

18. United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. Soil Surv. Staff, U.S. Dep. Agric. Handb. 18.

19. Federal Register. July 13, 1994. Changes in hydric soils of the United States.

20. Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

21. Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

22. National Research Council. 1995. Wetlands: Characteristics and boundaries.

23. United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

24. Hurt, G.W., P.M. Whited, and R.F. Pringle, editors. 1998. Field indicators of hydric soils in the United States.

25. United States Department of Agriculture, Natural Resources Conservation Service. 1996. Soil survey laboratory methods manual. Soil Survey Investigations, Report 42, Version 3.0. http://soils.usda.gov/technical/

26. Federal Register. February 24, 1995. Hydric soils of the United States.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control is extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled

soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Cryptogams. Plants in the group of mosses, lichens, and ferns.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct potential natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association

of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field

moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K-sat. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Leeward. The side or slope sheltered or located away from the wind; downwind.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch);* and *coarse, more than 15 millimeters (about 0.6 inch)*.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Parna. A term used, especially in southeast Australia and the southwestern USA, for silt and sand-sized aggregrates of eolian clay occurring as sheets.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its ***Use and Management***, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Playa dune. A linear or curvilinear ridge of windblown, granular material (generally sand or parna) removed from the adjacent basin by wind erosion (deflation), and deposited on the leeward (prevailing downwind) margin of a playa, playa basin, or salina basin. The dune may be barren or vegetated.

Playa floor. The lowest extensive, flat to slightly concave surface within a playa basin, consisting of a dry lake bed or lake plain underlain by stratified clay, silt, or sand, and commonly by soluble salts.

Playa lake. A shallow, intermittent lake in an arid or semiarid region, covering or occupying a playa in the wet season but subsequently drying up; an *ephemeral lake* that upon evaporation leaves or forms a playa. Syn: *playa*

Playa rim. The convex, upper margin (shoulder) of a playa basin where the playa slope intersects the surrounding terrain.

Playa slope. The generally concave to slightly convex area within a playa basin that lies between the relatively level playa floor below (or playa step, if present) and the convex playa rim above. Overland flow is typically parallel down slope.

Playa step. The relatively level or gently inclined “terrace-like” bench or toeslope within a large playa basin flanking and topographically higher than the playa floor and below the playa slope; a bench or step-like surface within a playa basin that breaks the continuity of the playa slope and is modified by erosion and/or deposition. Temporary ponding may occur in response to precipitation/runoff events.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.
Relief. The elevations or inequalities of a land surface, considered collectively.
Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.
Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.
Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.
Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.
Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.
Root zone. The part of the soil that can be penetrated by plant roots.
Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.
Salina. (a) A place where crystalline salt deposits are formed or found, such as a salt flat or pan, a salada, or a salt lick; esp. a salt-encrusted playa or a *wet playa*. (b) A body of saline water, such as a salt pond, lake, well, or spring, or a playa lake, that has a high concentration of salts.
Saline lake. An inland body of water situated in an arid or semiarid region, having no outlet to the sea, and containing a high concentration of dissolved salts (principally sodium chloride). See also: *Salina*
Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.
Saline-Sodic Soil. A soil containing sufficient exchangeable sodium to interfere with the growth of most crop plants and containing appreciable quantities of soluble salts. The exchangeable sodium ratio is greater than 0.15, conductivity of the soil solution, at saturated water content, of >4dSm-1 (at 25º C.) and the pH is usually 8.5 or less in the saturated soil.
Salty water (in tables). Water that is too salty for consumption by livestock.
Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.
Sandstone. Sedimentary rock containing dominantly sand-sized particles.
Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.
Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.
Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.
Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.
Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.
Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike. All the soils of a given series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na+ to Ca ++ + Mg++. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes, in mm, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy (laminated)*, *prismatic (vertical axis of aggregates longer than horizontal)*, *columnar (prisms with rounded tops)*, *blocky (angular or subangular)*, and *granular. Structureless soils are either single grained (each grain by itself, as in dune sand)* or *massive (the particles adhering without any regular cleavage, as in many hardpans)*.

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windward. The side located toward the direction from which the wind is blowing; facing the wind.

Tables

Table 1.–Temperature and Precipitation

(Recorded in the period 1971-2000 at Levelland, Texas)

Month	Temperature (Degrees F)						Precipitation (Inches)				
				2 years in 10 will have				2 years in 10 will have			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than	Minimum temperature less than	Average number of growing degree days*	Average	less than	more than	Average number of days w/0.1 or more	Average Snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	53.4	23.6	38.5	78	4	10	0.59	0.07	1.11	1	2.6
February-	59.1	27.1	43.1	83	7	37	0.63	0.14	1.06	2	2.5
March----	67.2	33.0	50.1	89	13	115	0.58	0.12	0.98	1	0.5
April----	75.5	41.8	58.7	95	24	288	1.03	0.21	1.80	2	0.2
May------	83.9	52.0	68.0	102	36	558	2.35	0.93	3.65	4	0.0
June-----	91.1	60.6	75.9	107	48	776	2.78	1.04	4.37	4	0.0
July-----	92.7	63.7	78.2	105	57	876	2.22	0.60	3.57	4	0.0
August---	90.3	62.2	76.2	102	54	812	2.95	1.09	4.73	4	0.0
September	83.9	55.6	69.8	99	38	596	3.23	0.59	5.92	4	0.0
October--	75.7	44.1	59.9	95	26	325	1.62	0.14	3.10	2	0.4
November-	63.2	32.5	47.8	85	13	83	0.85	0.18	1.47	1	0.9
December-	54.9	25.2	40.0	78	4	16	0.83	0.13	1.39	2	2.8
Yearly:											
Average	74.3	43.4	58.8	---	---	---	----	----	----	---	---
Extreme	115	-10	---	109	0	---	----	----	----	---	---
Total	---	---	---	---	---	4,492	19.65	14.89	23.80	31	9.8

Average number of days per year with at least 1 inch of snow on the ground: 5

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (threshold: 50.0 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Levelland, Texas)

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing Temperature in spring:			
1 year in 10 later than--	April 7	April 11	April 20
2 years in 10 later than--	March 31	April 7	April 16
5 years in 10 later than--	March 18	March 29	April 7
First freezing temperature in fall:			
1 year in 10 earlier than--	November 1	October 20	October 14
2 years in 10 earlier than--	November 7	October 26	October 18
5 years in 10 earlier than--	November 17	November 7	October 27

Table 3.—Growing Season

(Recorded for the period 1971-2000 at Levelland, Texas)

Probability	Daily Minimum Temperature		
	Number of days higher than 24°F	Number of days higher than 28°F	Number of days higher than 32°F
	Days	Days	Days
9 years in 10	217	201	188
8 years in 10	226	208	192
5 years in 10	243	222	201
2 years in 10	259	235	209
1 year in 10	268	242	213

Table 4.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AcA	Acuff loam, 0 to 1 percent slopes	100,701	17.3
AcB	Acuff loam, 1 to 3 percent slopes	6,614	1.1
AfA	Amarillo fine sandy loam, 0 to 1 percent slopes	161,509	27.8
AfB	Amarillo fine sandy loam, 1 to 3 percent slopes	82,852	14.2
AfC	Amarillo fine sandy loam, 3 to 5 percent slopes	276	*
ArA	Arch loam, 0 to 1 percent slopes	1,953	0.3
AvA	Arvana fine sandy loam, 0 to 1 percent slopes	9,173	1.6
AvB	Arvana fine sandy loam, 1 to 3 percent slopes	5,518	0.9
BcA	Bippus clay loam, 0 to 2 percent slopes, occasionally flooded	1,699	0.3
BeC	Berda loam, 3 to 5 percent slopes	1,283	0.2
BP	Borrow pits	723	0.1
BpD	Berda-Potter complex, 3 to 12 percent slopes	2,338	0.4
ChA	Chapel clay, 0 to 1 percent slopes, occasionally ponded	987	0.2
CtC	Creta very fine sandy loam, 1 to 5 percent slopes	660	0.1
DRC	Drake soils, 1 to 8 percent slopes	8,245	1.4
DRE	Drake soils, 8 to 20 percent slopes	398	*
EsA	Estacado loam, 0 to 1 percent slopes	8,779	1.5
FrA	Friona loam, 0 to 1 percent slopes	2,859	0.5
KmB	Kimberson gravelly loam, 0 to 3 percent slopes	3,356	0.6
LDA	Levelland soils, 0 to 2 percent slopes, occasionally flooded	560	*
LDF	Landfill	121	*
LeA	Lenorah fine sandy loam, 0 to 1 percent slopes	715	0.1
LoA	Lofton clay loam, 0 to 1 percent slopes	1,129	0.2
M-W	Miscellaneous water	63	*
MdA	Midessa fine sandy loam, 0 to 1 percent slopes	7,140	1.2
MdB	Midessa fine sandy loam, 1 to 3 percent slopes	10,386	1.8
MPC	Midessa and Posey fine sandy loams, 3 to 8 percent slopes	2,611	0.4
NtC	Nutivoli fine sand, 3 to 8 percent slopes	256	*
OcA	Olton clay loam, 0 to 1 percent slopes	16,609	2.9
PAB	Patricia and Amarillo loamy fine sands, 0 to 3 percent slopes	44,897	7.7
PeA	Pep loam, 0 to 1 percent slopes	12,530	2.2
PeB	Pep loam, 1 to 3 percent slopes	4,009	0.7
PGE	Potter soils, 3 to 20 percent slopes	746	0.1
PoA	Portales loam, 0 to 1 percent slopes	18,722	3.2
PoB	Portales loam, 1 to 3 percent slopes	23,024	4.0
PsA	Posey fine sandy loam, 0 to 1 percent slopes	2,811	0.5
PsB	Posey fine sandy loam, 1 to 3 percent slopes	18,375	3.2
PsC	Posey fine sandy loam, 3 to 8 percent slopes	1,500	0.3
RcA	Ranco clay, 0 to 1 percent slopes, frequently ponded	4,259	0.7
SgA	Seagraves fine sandy loam, 0 to 1 percent slopes	502	*
ShB	Sharvana fine sandy loam, 0 to 3 percent slopes	2,013	0.3
SL	Water, intermittent, salt lake	538	*
SpA	Sparenberg clay, 0 to 1 percent slopes, occasionally ponded	2,732	0.5
TkA	Tokio fine sandy loam, 0 to 1 percent slopes	602	0.1
TkB	Tokio loamy fine sand, 0 to 2 percent slopes	1,619	0.3
W	Water	37	*
YeA	Yellowlake silty clay loam, 0 to 1 percent slopes, rarely ponded	474	*
YhE	Yellowhouse gravelly clay loam, 3 to 20 percent slopes	106	*
ZmA	Zita loam, 0 to 1 percent slopes	2,547	0.4
	Total	581,556	100.0

* Less than 0.1 percent.

Table 5.—Irrigated and Nonirrigated Yields by Map Unit Component

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability		Corn		Cotton lint		Grain sorghum		Peanuts		Wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Bu	Bu
AcA:												
Acuff	3e	2e	---	210.00	900.00	1,800.00	3,640.00	7,280.00	---	---	40.00	80.00
AcB:												
Acuff	3e	3e	---	190.00	800.00	1,600.00	3,080.00	6,160.00	---	---	35.00	70.00
AfA:												
Amarillo	3e	2e	---	210.00	900.00	1,800.00	3,640.00	7,280.00	---	5,500.00	40.00	80.00
AfB:												
Amarillo	3e	3e	---	190.00	800.00	1,600.00	3,080.00	6,160.00	---	5,000.00	35.00	70.00
AfC:												
Amarillo	4e	4e	---	170.00	700.00	1,400.00	2,800.00	5,600.00	---	5,000.00	30.00	60.00
ArA:												
Arch	4e	3e	---	---	450.00	900.00	1,120.00	2,240.00	---	---	20.00	40.00
AvA:												
Arvana	3e	2e	---	180.00	750.00	1,500.00	2,800.00	5,600.00	---	5,100.00	33.00	65.00
AvB:												
Arvana	3e	3e	---	160.00	650.00	1,300.00	2,240.00	4,480.00	---	4,900.00	28.00	55.00
BcA:												
Bippus	2w	2w	---	---	800.00	1,600.00	3,200.00	6,400.00	---	---	37.00	75.00
BeC:												
Berda	4e	4e	---	---	---	---	---	---	---	---	---	---
BP:												
Borrow pits	8s	---	---	---	---	---	---	---	---	---	---	---
BpD:												
Berda	6e	---	---	---	---	---	---	---	---	---	---	---

Table 5.—Irrigated and Nonirrigated Yields by Map Unit Component—Continued

Map symbol and soil name	Land capability		Corn		Cotton lint		Grain sorghum		Peanuts		Wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Bu	Bu
Potter	7s	---	---	---	---	---	---	---	---	---	---	---
ChA:												
Chapel	4w	---	---	---	600.00	1,200.00	2,240.00	4,480.00	---	---	28.00	55.00
CtC:												
Creta	4e	---	---	---	---	---	---	---	---	---	---	---
DRC:												
Drake	6e	---	---	---	450.00	---	2,520.00	---	---	---	35.00	---
DRE:												
Drake	6e	---	---	---	---	---	---	---	---	---	---	---
EsA:												
Estacado	3e	2e	---	190.00	800.00	1,600.00	3,080.00	6,160.00	---	---	35.00	70.00
FrA:												
Friona	3e	2e	---	180.00	750.00	1,500.00	2,800.00	5,600.00	---	---	33.00	65.00
KmB:												
Kimberson	7s	---	---	---	---	---	---	---	---	---	---	---
LDA:												
Levelland	2w	2w	---	---	600.00	1,200.00	1,960.00	4,200.00	---	---	30.00	50.00
LDF:												
Landfill	8s	---	---	---	---	---	---	---	---	---	---	---
LeA:												
Lenorah	6s	4e	---	---	450.00	900.00	1,680.00	3,360.00	---	---	20.00	40.00
LoA:												
Lofton	3e	2s	---	210.00	800.00	1,600.00	3,200.00	6,400.00	---	---	37.00	75.00
M-W:												
Miscellaneous water	---	---	---	---	---	---	---	---	---	---	---	---
MdA:												
Midessa	3e	2e	---	---	550.00	1,100.00	1,960.00	3,920.00	---	---	25.00	50.00

Table 5.—Irrigated and Nonirrigated Yields by Map Unit Component—Continued

Map symbol and soil name	Land capability		Corn		Cotton lint		Grain sorghum		Peanuts		Wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Bu	Bu
MdB:												
Midessa	3e	3e	---	---	450.00	900.00	1,400.00	2,800.00	---	---	20.00	40.00
MPC:												
Midessa	6e	---	---	---	---	---	---	---	---	---	---	---
Posey	6e	---	---	---	---	---	---	---	---	---	---	---
NtC:												
Nutivoli	6e	---	---	---	---	---	---	---	---	---	---	---
OcA:												
Olton	3e	2e	---	210.00	900.00	1,800.00	3,640.00	7,280.00	---	---	40.00	80.00
PAB:												
Patricia	4e	3e	---	210.00	900.00	1,800.00	3,640.00	7,280.00	---	6,000.00	40.00	80.00
Amarillo	4e	3e	---	210.00	900.00	1,800.00	3,640.00	7,280.00	---	6,000.00	40.00	80.00
PeA:												
Pep	3e	2e	---	---	550.00	1,100.00	1,960.00	3,920.00	---	---	25.00	50.00
PeB:												
Pep	4e	3e	---	---	450.00	900.00	1,400.00	2,800.00	---	---	20.00	40.00
PGE:												
Potter	7s	---	---	---	---	---	---	---	---	---	---	---
PoA:												
Portales	3e	2e	---	---	600.00	1,200.00	2,120.00	4,200.00	---	---	25.00	50.00
PoB:												
Portales	4e	3e	---	---	500.00	1,000.00	1,560.00	3,080.00	---	---	20.00	40.00
PsA:												
Posey	3e	2e	---	---	550.00	1,100.00	1,960.00	3,920.00	---	---	25.00	50.00
PsB:												
Posey	3e	3e	---	---	450.00	900.00	1,400.00	2,800.00	---	---	20.00	40.00

Table 5.—Irrigated and Nonirrigated Yields by Map Unit Component—Continued

Map symbol and soil name	Land capability		Corn		Cotton lint		Grain sorghum		Peanuts		Wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Lbs	Lbs	Lbs	Lbs	Lbs	Lbs	Bu	Bu
PsC:												
Posey	6e	---	---	---	350.00	700.00	1,120.00	2,240.00	---	---	15.00	30.00
RcA:												
Ranco	6w	---	---	---	---	---	---	---	---	---	---	---
SgA:												
Seagraves	4e	3e	---	180.00	750.00	1,500.00	2,800.00	5,600.00	---	5,000.00	38.00	65.00
ShB:												
Sharvana	6s	4s	---	---	---	---	---	---	---	---	---	---
SL:												
Water, intermittent, salt lake	7w	---	---	---	---	---	---	---	---	---	---	---
SpA:												
Sparenberg	4w	---	---	---	650.00	1,300.00	2,240.00	4,480.00	---	---	30.00	55.00
TkA:												
Tokio	3e	2e	---	190.00	800.00	1,600.00	3,080.00	6,160.00	---	5,000.00	35.00	70.00
TkB:												
Tokio	4e	3e	---	180.00	750.00	1,500.00	2,800.00	5,600.00	---	4,900.00	33.00	65.00
W:												
Water	---	---	---	---	---	---	---	---	---	---	---	---
YeA:												
Yellowlake	4s	---	---	---	---	---	---	---	---	---	---	---
YhE:												
Yellowhouse	7s	---	---	---	---	---	---	---	---	---	---	---
ZmA:												
Zita	3e	2e	---	190.00	800.00	1,600.00	3,080.00	6,160.00	---	---	35.00	70.00

Table 6.—Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
AcA:					
Acuff	90	Not limited		Not limited	
AcB:					
Acuff	90	Not limited		Not limited	
AfA:					
Amarillo	90	Not limited		Not limited	
AfB:					
Amarillo	90	Not limited		Not limited	
AfC:					
Amarillo	85	Not limited		Not limited	
ArA:					
Arch	90	Not limited		Not limited	
AvA:					
Arvana	85	Somewhat limited		Somewhat limited	
		Depth to cemented pan	0.82	Depth to cemented pan	0.82
		Droughty	0.76	Droughty	0.76
AvB:					
Arvana	85	Somewhat limited		Somewhat limited	
		Depth to cemented pan	0.82	Depth to cemented pan	0.82
		Droughty	0.75	Droughty	0.75
BcA:					
Bippus	80	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
BeC:					
Berda	85	Not limited		Not limited	
BP:					
Borrow pits	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slope	1.00	Slow water movement	1.00
		Slow water movement	1.00	Slope	1.00
		Droughty	0.99	Droughty	0.99
		Runoff	0.40		

Table 6.—Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge—Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
BpD:					
Berda	55	Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01
Potter	30	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.35	Droughty	0.35
		Slope	0.01	Slope	0.01
ChA:					
Chapel	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Runoff	0.40		
CtC:					
Creta	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Sodium content	0.68	Sodium content	0.68
DRC:					
Drake	90	Not limited		Not limited	
DRE:					
Drake	90	Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63
EsA:					
Estacado	90	Not limited		Not limited	
FrA:					
Friona	85	Somewhat limited		Somewhat limited	
		Depth to cemented pan	0.35	Depth to cemented pan	0.35
		Droughty	0.27	Droughty	0.27
KmB:					
Kimberson	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Droughty	1.00
		Droughty	1.00	Depth to cemented pan	1.00
		Runoff	0.40		
LDA:					
Levelland	85	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
LDF:					
Landfill	100	Not rated		Not rated	

Table 6.—Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge—Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
LeA:					
Lenorah	85	Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00
		Salinity	0.97	Depth to saturated zone	0.50
		Depth to saturated zone	0.50	Flooding	0.20
LoA:					
Lofton	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Runoff	0.40		
M-W:					
Miscellaneous water	100	Not rated		Not rated	
MdA:					
Midessa	85	Not limited		Not limited	
MdB:					
Midessa	85	Not limited		Not limited	
MPC:					
Midessa	50	Not limited		Not limited	
Posey	35	Not limited		Not limited	
NtC:					
Nutivoli	90	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
		Leaching	0.45	Droughty	0.25
		Droughty	0.25		
OcA:					
Olton	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slow water movement	0.37
PAB:					
Patricia	50	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
Amarillo	45	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
PeA:					
Pep	85	Not limited		Not limited	
PeB:					
Pep	85	Not limited		Not limited	

Table 6.—Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge—Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Droughty	0.72	Droughty	0.72
		Slope	0.01	Slope	0.01
PoA:					
Portales	90	Not limited		Not limited	
PoB:					
Portales	90	Not limited		Not limited	
PsA:					
Posey	85	Not limited		Not limited	
PsB:					
Posey	85	Not limited		Not limited	
PsC:					
Posey	80	Not limited		Not limited	
RcA:					
Ranco	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40		
SgA:					
Seagraves	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
		Filtering capacity	0.99	Filtering capacity	0.99
ShB:					
Sharvana	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Droughty	1.00
		Droughty	1.00	Depth to cemented pan	1.00
SL:					
Water, intermittent, salt lake	100	Not rated		Not rated	

Table 6.—Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge—Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
SpA:					
Sparenberg	90	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Ponding	1.00	Ponding	1.00
		Runoff	0.40		
TkA:					
Tokio	90	Not limited		Not limited	
TkB:					
Tokio	90	Very limited		Very limited	
		Filtering capacity	0.99	Filtering capacity	0.99
W:					
Water	100	Not rated		Not rated	
YeA:					
Yellowlake	80	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Sodium content	1.00	Sodium content	1.00
		Salinity	1.00		
		Runoff	0.40		
YhE:					
Yellowhouse	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Slope	1.00	Slope	1.00
		Droughty	0.98	Droughty	0.98
		Runoff	0.40		
ZmA:					
Zita	90	Not limited		Not limited	

Table 7.—Agricultural Disposal of Wastewater by Irrigation and Overland Flow

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
AcA:					
Acuff	90	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
AcB:					
Acuff	90	Not limited		Very limited	
				Seepage	1.00
AfA:					
Amarillo	90	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
AfB:					
Amarillo	90	Not limited		Very limited	
				Seepage	1.00
AfC:					
Amarillo	85	Somewhat limited		Very limited	
		Too steep for surface application	0.08	Seepage	1.00
ArA:					
Arch	90	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
AvA:					
Arvana	85	Somewhat limited		Very limited	
		Depth to cemented pan	0.82	Seepage	1.00
		Droughty	0.76	Depth to cemented pan	1.00
				Too level	0.50
AvB:					
Arvana	85	Somewhat limited		Very limited	
		Depth to cemented pan	0.82	Seepage	1.00
		Droughty	0.75	Depth to cemented pan	1.00
BcA:					
Bippus	80	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
				Seepage	1.00
				Too level	0.50

Table 7.—Agricultural Disposal of Wastewater by Irrigation and Overland Flow—Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
BeC:					
Berda	85	Somewhat limited		Very limited	
		Too steep for surface application	0.08	Seepage	1.00
BP:					
Borrow pits	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00		
		Too steep for sprinkler application	1.00		
		Droughty	0.99		
BpD:					
Berda	55	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	0.10	Too steep for surface application	0.22
Potter	30	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	0.22
		Droughty	0.35		
		Too steep for sprinkler application	0.10		
ChA:					
Chapel	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Too level	0.50
CtC:					
Creta	90	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Sodium content	0.68	Sodium content	0.68

Table 7.—Agricultural Disposal of Wastewater by Irrigation and Overland Flow—Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
DRC:					
Drake	90	Somewhat limited		Very limited	
		Too steep for surface application	0.32	Seepage	1.00
DRE:					
Drake	90	Very limited		Very limited	
		Too steep for surface application	1.00	Seepage	1.00
		Too steep for sprinkler application	0.78	Too steep for surface application	1.00
EsA:					
Estacado	90	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
FrA:					
Friona	85	Somewhat limited		Very limited	
		Depth to cemented pan	0.35	Depth to cemented pan	1.00
		Droughty	0.27	Seepage	1.00
				Too level	0.50
KmB:					
Kimberson	85	Very limited		Very limited	
		Droughty	1.00	Depth to cemented pan	1.00
		Depth to cemented pan	1.00	Seepage	1.00
LDA:					
Levelland	85	Somewhat limited		Very limited	
		Flooding	0.60	Flooding	1.00
				Seepage	1.00
				Too level	0.50
LDF:					
Landfill	100	Not rated		Not rated	
LeA:					
Lenorah	85	Very limited		Very limited	
		Sodium content	1.00	Seepage	1.00
		Depth to saturated zone	0.50	Sodium content	1.00
				Too level	0.50
				Depth to saturated zone	0.50
				Flooding	0.20

Table 7.—Agricultural Disposal of Wastewater by Irrigation and Overland Flow—Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
LoA:					
Lofton	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Too level	0.68
				Seepage	0.62
M-W:					
Miscellaneous water	100	Not rated		Not rated	
MdA:					
Midessa	85	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
MdB:					
Midessa	85	Not limited		Very limited	
				Seepage	1.00
MPC:					
Midessa	50	Somewhat limited		Very limited	
		Too steep for surface application	0.32	Seepage	1.00
Posey	35	Somewhat limited		Very limited	
		Too steep for surface application	0.32	Seepage	1.00
NtC:					
Nutivoli	90	Very limited		Very limited	
		Filtering capacity	0.99	Seepage	1.00
		Too steep for surface application	0.32		
		Droughty	0.25		
OcA:					
Olton	85	Somewhat limited		Very limited	
		Slow water movement	0.37	Seepage	1.00
				Too level	0.68
PAB:					
Patricia	50	Very limited		Very limited	
		Filtering capacity	0.99	Seepage	1.00
Amarillo	45	Very limited		Very limited	
		Filtering capacity	0.99	Seepage	1.00

Table 7.—Agricultural Disposal of Wastewater by Irrigation and Overland Flow—Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
PeA:					
Pep	85	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
PeB:					
Pep	85	Not limited		Very limited	
				Seepage	1.00
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	0.22
		Droughty	0.72		
		Too steep for sprinkler application	0.10		
PoA:					
Portales	90	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
PoB:					
Portales	90	Not limited		Very limited	
				Seepage	1.00
PsA:					
Posey	85	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
PsB:					
Posey	85	Not limited		Very limited	
				Seepage	1.00
PsC:					
Posey	80	Somewhat limited		Very limited	
		Too steep for surface application	0.32	Seepage	1.00
RcA:					
Ranco	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Too level	0.82

Table 7.—Agricultural Disposal of Wastewater by Irrigation and Overland Flow—Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation: Rating class and limiting features	Value	Overland flow of wastewater: Rating class and limiting features	Value
SgA:					
Seagraves	90	Very limited		Very limited	
		Ponding	1.00	Seepage	1.00
		Slow water movement	1.00	Ponding	1.00
		Filtering capacity	0.99	Too level	0.50
ShB:					
Sharvana	85	Very limited		Very limited	
		Droughty	1.00	Seepage	1.00
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
SL:					
Water, intermittent, salt lake	100	Not rated		Not rated	
SpA:					
Sparenberg	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Too level	0.82
TkA:					
Tokio	90	Not limited		Very limited	
				Seepage	1.00
				Too level	0.50
TkB:					
Tokio	90	Very limited		Very limited	
		Filtering capacity	0.99	Seepage	1.00
W:					
Water	100	Not rated		Not rated	
YeA:					
Yellowlake	80	Very limited		Very limited	
		Slow water movement	1.00	Sodium content	1.00
		Sodium content	1.00	Too level	0.82
				Seepage	0.03
YhE:					
Yellowhouse	85	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
		Too steep for surface application	1.00	Too steep for surface application	1.00
		Too steep for sprinkler application	1.00		
		Droughty	0.98		

Table 7.—Agricultural Disposal of Wastewater by Irrigation and Overland Flow—Continued

Map symbol and soil name	Pct. of map unit	Disposal of wastewater by irrigation		Overland flow of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value
ZmA:					
Zita	90	Not limited		Very limited	
				Seepage	1.00
				Too level	0.68

Table 8.—Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AcA:					
Acuff	90	Very limited		Not limited	
		Slow water movement	1.00		
AcB:					
Acuff	90	Very limited		Not limited	
		Slow water movement	1.00		
AfA:					
Amarillo	90	Very limited		Not limited	
		Slow water movement	1.00		
AfB:					
Amarillo	90	Very limited		Not limited	
		Slow water movement	1.00		
AfC:					
Amarillo	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.08
ArA:					
Arch	90	Very limited		Not limited	
		Slow water movement	1.00		
AvA:					
Arvana	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	1.00		
AvB:					
Arvana	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	1.00		
BcA:					
Bippus	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Flooding	0.60
		Flooding	0.60		

Table 8.—Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment—Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
BeC:					
Berda	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.08
BP:					
Borrow pits	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Too steep for sprinkler irrigation	1.00
				Slow water movement	0.96
BpD:					
Berda	55	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Too steep for sprinkler irrigation	0.22
Potter	30	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Slow water movement	0.99
				Too steep for sprinkler irrigation	0.22
ChA:					
Chapel	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
CtC:					
Creta	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Slow water movement	0.96
				Sodium content	0.68
DRC:					
Drake	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.32
		Slope	0.12		

Table 8.—Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment—Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
DRE:					
Drake	90	Very limited		Very limited	
		Slope	1.00	Too steep for surface application	1.00
		Slow water movement	1.00	Too steep for sprinkler irrigation	1.00
EsA:					
Estacado	90	Very limited		Not limited	
		Slow water movement	1.00		
FrA:					
Friona	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	1.00		
KmB:					
Kimberson	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	1.00		
LDA:					
Levelland	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Flooding	0.60
		Flooding	0.60		
LDF:					
Landfill	100	Not rated		Not rated	
LeA:					
Lenorah	85	Very limited		Very limited	
		Depth to saturated zone	1.00	Sodium content	1.00
		Slow water movement	1.00	Depth to saturated zone	0.50
LoA:					
Lofton	85	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
M-W:					
Miscellaneous water	100	Not rated		Not rated	
MdA:					
Midessa	85	Very limited		Not limited	
		Slow water movement	1.00		

Table 8.—Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment—Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
MdB:					
Midessa	85	Very limited		Not limited	
		Slow water movement	1.00		
MPC:					
Midessa	50	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.32
		Slope	0.12		
Posey	35	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.32
		Slope	0.12		
NtC:					
Nutivoli	90	Somewhat limited		Very limited	
		Slope	0.12	Filtering capacity	0.99
				Too steep for surface application	0.32
OcA:					
Olton	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Slow water movement	0.26
PAB:					
Patricia	50	Very limited		Very limited	
		Slow water movement	1.00	Filtering capacity	0.99
Amarillo	45	Very limited		Very limited	
		Slow water movement	1.00	Filtering capacity	0.99
PeA:					
Pep	85	Very limited		Not limited	
		Slow water movement	1.00		
PeB:					
Pep	85	Very limited		Not limited	
		Slow water movement	1.00		

Table 8.—Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment—Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Too steep for surface application	1.00
		Slope	1.00	Slow water movement	0.99
				Too steep for sprinkler irrigation	0.22
PoA:					
Portales	90	Very limited		Not limited	
		Slow water movement	1.00		
PoB:					
Portales	90	Very limited		Not limited	
		Slow water movement	1.00		
PsA:					
Posey	85	Very limited		Not limited	
		Slow water movement	1.00		
PsB:					
Posey	85	Very limited		Not limited	
		Slow water movement	1.00		
PsC:					
Posey	80	Very limited		Somewhat limited	
		Slow water movement	1.00	Too steep for surface application	0.32
		Slope	0.12		
RcA:					
Ranco	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Slow water movement	1.00
SgA:					
Seagraves	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Filtering capacity	0.99
				Slow water movement	0.96

Table 8.—Agricultural Disposal of Wastewater by Rapid Infiltration and Slow Rate Treatment—Continued

Map symbol and soil name	Pct. of map unit	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
ShB:					
Sharvana	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.32		
SL:					
Water, intermittent, salt lake	100	Not rated		Not rated	
SpA:					
Sparenberg	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slow water movement	1.00
TkA:					
Tokio	90	Very limited		Not limited	
		Slow water movement	1.00		
TkB:					
Tokio	90	Very limited		Very limited	
		Slow water movement	1.00	Filtering capacity	0.99
W:					
Water	100	Not rated		Not rated	
YeA:					
Yellowlake	80	Very limited		Very limited	
		Slow water movement	1.00	Sodium content	1.00
		Depth to saturated zone	1.00	Slow water movement	1.00
YhE:					
Yellowhouse	85	Very limited		Very limited	
		Slow water movement	1.00	Slow water movement	1.00
		Slope	1.00	Too steep for surface application	1.00
				Too steep for sprinkler irrigation	1.00
ZmA:					
Zita	90	Very limited		Not limited	
		Slow water movement	1.00		

Table 9.—Large Animal Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench \(TX): Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Pit: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Trench: Rating class and limiting features	Value
AcA:							
Acuff	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
AcB:							
Acuff	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
AfA:							
Amarillo	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
AfB:							
Amarillo	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
AfC:							
Amarillo	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
ArA:							
Arch	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
AvA:							
Arvana	85	Very limited		Somewhat limited		Somewhat limited	
		Cemented pan	1.00	Depth to thin cemented pan	0.50	Depth to thin cemented pan	0.50
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
AvB:							
Arvana	85	Very limited		Somewhat limited		Somewhat limited	
		Cemented pan	1.00	Depth to thin cemented pan	0.50	Depth to thin cemented pan	0.50
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
BcA:							
Bippus	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.—Large Animal Disposal—Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench \(TX)		Catastrophic Mortality, Large Animal Disposal, \Pit		Catastrophic Mortality, Large Animal Disposal, \Trench	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BeC:							
Berda	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
BP:							
Borrow pits	95	Not rated		Very limited		Very limited	
				Ponding	1.00	Ponding	1.00
				Slope	1.00	Slope	1.00
				Cutbanks cave	0.09	Cutbanks cave	0.09
BpD:							
Berda	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Slope	0.37	Water gathering	0.10
				Water gathering	0.10	Cutbanks cave	0.01
				Cutbanks cave	0.01	Slope	0.01
Potter	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.03	Slope	0.37	Water gathering	0.03
				Water gathering	0.03	Cutbanks cave	0.01
				Cutbanks cave	0.01	Slope	0.01
ChA:							
Chapel	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.58	Clay content	0.50	Clay content	0.50
		Water gathering	0.30	Water gathering	0.30	Water gathering	0.30
				Cutbanks cave	0.05	Cutbanks cave	0.05
CtC:							
Creta	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Excess sodium	1.00	Excess sodium	1.00
		Excess Sodium	1.00	Clay content	0.45	Clay content	0.45
		Too clayey	0.85	Cutbanks cave	0.29	Cutbanks cave	0.29
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
DRC:							
Drake	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
DRE:							
Drake	90	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Slope	1.00	Slope	0.63
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
EsA:							
Estacado	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.—Large Animal Disposal—Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench \(TX)		Catastrophic Mortality, Large Animal Disposal, \Pit		Catastrophic Mortality, Large Animal Disposal, \Trench	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
FrA:							
Friona	85	Very limited		Somewhat limited		Somewhat limited	
		Cemented pan	1.00	Depth to thin cemented pan	0.50	Depth to thin cemented pan	0.50
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
KmB:							
Kimberson	85	Very limited		Somewhat limited		Somewhat limited	
		Cemented pan	1.00	Cutbanks cave	0.93	Cutbanks cave	0.93
		Water gathering	0.10	Depth to thin cemented pan	0.50	Depth to thin cemented pan	0.50
				Adsorption	0.25	Adsorption	0.25
				Water gathering	0.10	Water gathering	0.10
LDA:							
Levelland	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01
LDF:							
Landfill	100	Not rated		Not rated		Not rated	
LeA:							
Lenorah	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Wetness	1.00	Wetness	1.00
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Excess Sodium	1.00	Excess sodium	1.00	Excess sodium	1.00
		Flooding	0.50	Water gathering	0.50	Water gathering	0.50
		Water gathering	0.50	Flooding	0.20	Flooding	0.20
LoA:							
Lofton	85	Somewhat limited		Very limited		Very limited	
		Too clayey	0.85	Ponding	1.00	Ponding	1.00
		Water gathering	0.10	Clay content	0.44	Clay content	0.44
				Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Clay content	0.02	Clay content	0.02
				Cutbanks cave	0.01	Cutbanks cave	0.01
MdB:							
Midessa	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Clay content	0.02	Clay content	0.02
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.—Large Animal Disposal—Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench \(TX): Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Pit: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Trench: Rating class and limiting features	Value
MPC:							
Midessa	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Clay content	0.02	Clay content	0.02
				Cutbanks cave	0.01	Cutbanks cave	0.01
Posey	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Clayey	0.26	Water gathering	0.20	Water gathering	0.20
		Water gathering	0.20	Cutbanks cave	0.01	Cutbanks cave	0.01
NtC:							
Nutivoli	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too Sandy	0.75	Too sandy	0.99	Too sandy	0.99
				Cutbanks cave	0.99	Cutbanks cave	0.99
OcA:							
Olton	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Clay content	0.19	Clay content	0.19
				Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
PAB:							
Patricia	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
Amarillo	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
PeA:							
Pep	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
PeB:							
Pep	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.03	Slope	0.37	Water gathering	0.03
				Water gathering	0.03	Cutbanks cave	0.01
				Cutbanks cave	0.01	Slope	0.01
PoA:							
Portales	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01
PoB:							
Portales	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.10	Water gathering	0.10	Water gathering	0.10
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.—Large Animal Disposal—Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench \(TX)		Catastrophic Mortality, Large Animal Disposal, \Pit		Catastrophic Mortality, Large Animal Disposal, \Trench	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PsA:							
Posey	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Clayey	0.26	Water gathering	0.10	Water gathering	0.10
		Water gathering	0.10	Cutbanks cave	0.01	Cutbanks cave	0.01
PsB:							
Posey	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Clayey	0.26	Water gathering	0.10	Water gathering	0.10
		Water gathering	0.10	Cutbanks cave	0.01	Cutbanks cave	0.01
PsC:							
Posey	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Clayey	0.26	Water gathering	0.20	Water gathering	0.20
		Water gathering	0.20	Cutbanks cave	0.01	Cutbanks cave	0.01
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Wetness	1.00	Wetness	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Wetness	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	0.85	Cutbanks cave	1.00	Cutbanks cave	1.00
		Water gathering	0.50	Water gathering	0.50	Water gathering	0.50
SgA:							
Seagraves	90	Somewhat limited		Very limited		Very limited	
		Water gathering	0.30	Ponding	1.00	Ponding	1.00
		Clayey	0.01	Water gathering	0.30	Water gathering	0.30
				Cutbanks cave	0.01	Cutbanks cave	0.01
ShB:							
Sharvana	85	Very limited		Somewhat limited		Somewhat limited	
		Cemented pan	1.00	Depth to thin cemented pan	0.50	Depth to thin cemented pan	0.50
				Cutbanks cave	0.01	Cutbanks cave	0.01
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.85	Cutbanks cave	1.00	Cutbanks cave	1.00
		Water gathering	0.30	Clay content	0.50	Clay content	0.50
				Water gathering	0.30	Water gathering	0.30
TkA:							
Tokio	90	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Seepage	0.50	Seepage	0.50
		Too clayey	0.85	Water gathering	0.20	Water gathering	0.20
		Water gathering	0.20	Cutbanks cave	0.01	Cutbanks cave	0.01

Table 9.—Large Animal Disposal—Continued

Map symbol and soil name	Pct. of map unit	Animal Carcass Disposal Trench: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Pit: Rating class and limiting features	Value	Catastrophic Mortality, Large Animal Disposal, \Trench: Rating class and limiting features	Value
TkB:							
Tokio	90	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Seepage	0.50	Seepage	0.50
		Too clayey	0.85	Water gathering	0.20	Water gathering	0.20
		Water gathering	0.20	Cutbanks cave	0.01	Cutbanks cave	0.01
W:							
Water	100	Not rated		Not rated		Not rated	
YeA:							
Yellowlake	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Wetness	1.00	Wetness	1.00
		Excess Sodium	1.00	Excess sodium	1.00	Excess sodium	1.00
		Excess Salt	1.00	Cutbanks cave	1.00	Cutbanks cave	1.00
		Too clayey	0.85	Excess salt	1.00	Excess salt	1.00
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
YhE:							
Yellowhouse	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Clay content	0.50	Clay content	0.50
		Water gathering	0.10	Cutbanks cave	0.31	Cutbanks cave	0.31
				Water gathering	0.10	Water gathering	0.10
ZmA:							
Zita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Water gathering	0.20	Water gathering	0.20	Water gathering	0.20
				Cutbanks cave	0.01	Cutbanks cave	0.01

Table 10.—Rangeland Productivity

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
AcA:				
Acuff	Deep Hardland 16-21" Pz	2,500	1,800	1,100
AcB:				
Acuff	Deep Hardland 16-21" Pz	2,500	1,800	1,100
AfA:				
Amarillo	Sandy Loam 16-21" Pz	2,800	2,100	1,400
AfB:				
Amarillo	Sandy Loam 16-21" Pz	2,800	2,100	1,400
AfC:				
Amarillo	Sandy Loam 16-21" Pz	2,600	1,900	1,200
ArA:				
Arch	High Lime 16-21" Pz	1,500	1,200	800
AvA:				
Arvana	Sandy Loam 16-21" Pz	2,100	1,600	1,000
AvB:				
Arvana	Sandy Loam 16-21" Pz	2,100	1,600	1,000
BcA:				
Bippus	Draw 16-24" Pz	3,000	2,400	1,800
BeC:				
Berda	Hardland Slopes 16-24" Pz	2,500	1,800	1,100
BP:				
Pits, borrow	---	---	---	---
BpD:				
Berda	Hardland Slopes 16-24" Pz	2,500	1,800	1,100
Potter	Very Shallow 16-24" Pz	1,000	800	500
ChA:				
Chapel	Playa 16-21" Pz	2,800	1,300	600
CtC:				
Creta	Hardland Slopes 16-24" Pz	2,300	1,600	900
DRC:				
Drake	High Lime 16-21" Pz	1,800	1,300	900
DRE:				
Drake	High Lime 16-21" Pz	1,700	1,200	800
EsA:				
Estacado	Deep Hardland 16-21" Pz	2,300	1,600	1,000
FrA:				
Friona	Deep Hardland 16-21" Pz	2,100	1,600	1,000

Table 10.—Rangeland Productivity—Continued

Map symbol and soil name	Ecological site	Total dry-weight production: Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
KmB:				
Kimberson	Very Shallow 16-21" Pz	1,000	700	400
LDA:				
Levelland	Draw 16-21" Pz	3,100	2,400	1,500
LDF:				
Dumps, sanitary landfill	---	---	---	---
LeA:				
Lenorah	Wet Saline 16-21" Pz	2,000	1,200	700
LoA:				
Lofton	Deep Hardland 16-21" Pz	2,000	1,800	1,100
M-W:				
Water, miscellaneous	---	---	---	---
MdA:				
Midessa	Limy Upland 16-21" Pz	2,400	1,700	1,000
MdB:				
Midessa	Limy Upland 16-21" Pz	2,400	1,700	1,000
MPC:				
Midessa	Limy Upland 16-21" Pz	2,400	1,700	1,000
Posey	Limy Upland 16-21" Pz	2,400	1,700	1,000
NtC:				
Nutivoli	Sand Hills 16-21" Pz	2,000	1,400	1,000
OcA:				
Olton	Deep Hardland 16-21" Pz	2,300	1,600	900
PAB:				
Patricia	Sandy 16-21" Pz	2,700	2,000	1,300
Amarillo	Sandy 16-21" Pz	2,600	1,900	1,200
PeA:				
Pep	Limy Upland 16-21" Pz	2,000	1,300	800
PeB:				
Pep	Limy Upland 16-21" Pz	2,000	1,300	800
PGE:				
Potter	Very Shallow 16-24" Pz	1,000	800	500
PoA:				
Portales	Limy Upland 16-21" Pz	2,000	1,300	800
PoB:				
Portales	Limy Upland 16-21" Pz	2,000	1,300	800
PsA:				
Posey	Limy Upland 16-21" Pz	2,400	1,700	1,000

Table 10.—Rangeland Productivity—Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
PsB:				
Posey	Limy Upland 16-21" Pz	2,400	1,700	1,000
PsC:				
Posey	Limy Upland 16-21" Pz	2,400	1,700	1,000
RcA:				
Ranco	Playa 16-21" Pz	3,000	1,500	800
SgA:				
Seagraves	Sandy Loam 16-21" Pz	2,800	2,000	1,000
ShB:				
Sharvana	Very Shallow 16-21" Pz	1,100	800	500
SL:				
Water, intermittent, salt lake	---	---	---	---
SpA:				
Sparenberg	Playa 16-21" Pz	2,800	1,300	600
TkA:				
Tokio	Sandy Loam 16-21" Pz	2,500	1,800	1,100
TkB:				
Tokio	Sandy 16-21" Pz	2,400	1,700	1,000
W:				
Water	---	---	---	---
YeA:				
Yellowlake	Wet Saline 16-21" Pz	1,500	1,100	800
YhE:				
Yellowhouse	Very Shallow 16-24" Pz	1,100	800	500
ZmA:				
Zita	Deep Hardland 16-21" Pz	2,200	1,700	1,100

Table 11.—Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
AcA: Acuff	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; Afghan pine; lacebark elm	Siberian elm
AcB: Acuff	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; Afghan pine; lacebark elm	Siberian elm
AfA: Amarillo	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm
AfB: Amarillo	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm
AfC: Amarillo	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm

Table 11.–Windbreaks and Environmental Plantings–Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
ArA:					
Arch	fourwing saltbush	---	eastern redcedar	Siberian elm	---
AvA:					
Arvana	skunkbush sumac; fourwing saltbush	Rocky Mountain juniper; redbud; desert willow	eastern redcedar; lacebark elm; osageorange; oriental arborvitae; hackberry	Siberian elm	---
AvB:					
Arvana	skunkbush sumac; fourwing saltbush	Rocky Mountain juniper; redbud; desert willow	eastern redcedar; lacebark elm; osageorange; oriental arborvitae; hackberry	Siberian elm	---
BcA:					
Bippus	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm; Afghan pine	Siberian elm
BeC:					
Berda	fourwing saltbush	---	eastern redcedar	Siberian elm	---
BP:					
Borrow pits	---	---	---	---	---
BpD:					
Berda	fourwing saltbush	---	eastern redcedar	Siberian elm	---
Potter	---	---	---	---	---
ChA:					
Chapel	---	---	---	---	---

Table 11.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
CtC: Creta	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm; Afghan pine	Siberian elm
DRC: Drake	fourwing saltbush	---	eastern redcedar	Siberian elm	---
DRE: Drake	fourwing saltbush	---	eastern redcedar	Siberian elm	---
EsA: Estacado	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm; Afghan pine	Siberian elm
FrA: Friona	skunkbush sumac; fourwing saltbush	Rocky Mountain juniper; redbud; desert willow	eastern redcedar; lacebark elm; osageorange; oriental arborvitae; hackberry	Siberian elm	---
KmB: Kimberson	---	---	---	---	---
LDA: Levelland	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; lacebark elm	Siberian elm

Table 11.—Windbreaks and Environmental Plantings—Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
LDF:					
Landfill	---	---	---	---	---
LeA:					
Lenorah	fourwing saltbush	---	eastern redcedar	Siberian elm	---
LoA:					
Lofton	skunkbush sumac; Nanking cherry; lilac	Rocky Mountain juniper; redbud	eastern redcedar; oriental arborvitae; osageorange	ponderosa pine; bur oak; Siberian elm; hackberry; lacebark elm	---
M-W:					
Miscellaneous water	---	---	---	---	---
MdA:					
Midessa	fourwing saltbush	---	eastern redcedar	Siberian elm	---
MdB:					
Midessa	fourwing saltbush	---	eastern redcedar	Siberian elm	---
MPC:					
Midessa	fourwing saltbush	---	eastern redcedar	Siberian elm	---
Posey	fourwing saltbush	---	eastern redcedar	Siberian elm	---
NtC:					
Nutivoli	---	---	---	---	---
OcA:					
Olton	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm; Afghan pine	Siberian elm
PAB:					
Patricia	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm

Table 11.–Windbreaks and Environmental Plantings–Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Amarillo	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm
PeA:					
Pep	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PeB:					
Pep	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PGE:					
Potter	---	---	---	---	---
PoA:					
Portales	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PoB:					
Portales	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PsA:					
Posey	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PsB:					
Posey	fourwing saltbush	---	eastern redcedar	Siberian elm	---
PsC:					
Posey	fourwing saltbush	---	eastern redcedar	Siberian elm	---
RcA:					
Ranco	---	---	---	---	---
SgA:					
Seagraves	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm
ShB:					
Sharvana	---	---	---	---	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
SL: Water, intermittent, salt lake	---	---	---	---	---
SpA: Sparenberg	---	---	---	---	---
TkA: Tokio	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm
TkB: Tokio	skunkbush sumac; lilac; honeysuckle	desert willow; redbud; Chickasaw plum	Rocky Mountain juniper; eastern redcedar; oriental arborvitae; osageorange	Austrian pine; ponderosa pine; bur oak; green ash; hackberry; honeylocust; mulberry; Afghan pine; lacebark elm	Siberian elm
W: Water	---	---	---	---	---
YeA: Yellowlake	---	---	---	---	---
YhE: Yellowhouse	---	---	---	---	---
ZmA: Zita	honeysuckle; Nanking cherry; skunkbush sumac; cotoneaster	redbud; desert willow; winterberry euonymus	little walnut; Rocky Mountain juniper; eastern redcedar; osageorange; Austrian pine; Scotch pine; oriental arborvitae	American sycamore; pecan; hackberry; green ash; honeylocust; mulberry; ponderosa pine; bur oak; shumard oak; lacebark elm	Siberian elm

Table 12.—Camp Areas, Picnic Areas, and Playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AcA:							
Acuff	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
AcB:							
Acuff	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
AfA:							
Amarillo	90	Not limited		Not limited		Not limited	
AfB:							
Amarillo	90	Not limited		Not limited		Not limited	
AfC:							
Amarillo	85	Not limited		Not limited		Somewhat limited	
						Slope	0.50
ArA:							
Arch	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
AvA:							
Arvana	85	Somewhat limited		Somewhat limited		Not limited	
		Depth to cemented pan	0.82	Depth to cemented pan	0.82		
AvB:							
Arvana	85	Somewhat limited		Somewhat limited		Not limited	
		Depth to cemented pan	0.82	Depth to cemented pan	0.82		
BcA:							
Bippus	80	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
BeC:							
Berda	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.50
						Dusty	0.50
BP:							
Borrow pits	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Gravel content	1.00	Gravel content	1.00	Slope	1.00
		Slow water movement	0.96	Slow water movement	0.96	Slow water movement	0.96
BpD:							
Berda	55	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Slope	1.00
		Slope	0.01	Slope	0.01	Dusty	0.50

Table 12.—Camp Areas, Picnic Areas, and Playgrounds—Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
Potter	30	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Dusty	0.50	Dusty	0.50	Slow water movement	0.99
		Slope	0.01	Slope	0.01	Gravel content	0.92
						Dusty	0.50
ChA:							
Chapel	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
CtC:							
Creta	90	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Slope	0.12
DRC:							
Drake	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.88
						Dusty	0.50
DRE:							
Drake	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
EsA:							
Estacado	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
FrA:							
Friona	85	Somewhat limited		Somewhat limited		Not limited	
		Depth to cemented pan	0.35	Depth to cemented pan	0.35		
KmB:							
Kimberson	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
						Gravel content	0.56
LDA:							
Levelland	85	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
LDF:							
Landfill	100	Not rated		Not rated		Not rated	
LeA:							
Lenorah	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Sodium content	1.00	Sodium content	1.00
		Sodium content	1.00	Too sandy	0.24	Too sandy	0.24
		Too sandy	0.24				

Table 12.—Camp Areas, Picnic Areas, and Playgrounds—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Not limited		Not limited		Not limited	
MdB:							
Midessa	85	Not limited		Not limited		Not limited	
MPC:							
Midessa	50	Not limited		Not limited		Somewhat limited	
						Slope	0.88
Posey	35	Not limited		Not limited		Somewhat limited	
						Slope	0.88
NtC:							
Nutivoli	90	Very limited		Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00	Too sandy	1.00
						Slope	0.88
OcA:							
Olton	85	Not limited		Not limited		Not limited	
PAB:							
Patricia	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.97	Too sandy	0.97	Too sandy	0.97
Amarillo	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.88	Too sandy	0.88	Too sandy	0.88
PeA:							
Pep	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
PeB:							
Pep	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Slow water movement	0.99	Slow water movement	0.99	Slope	1.00
		Dusty	0.50	Dusty	0.50	Slow water movement	0.99
		Slope	0.01	Slope	0.01	Gravel content	0.92
						Dusty	0.50
PoA:							
Portales	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50

Table 12.—Camp Areas, Picnic Areas, and Playgrounds—Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
PoB:							
Portales	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
PsA:							
Posey	85	Not limited		Not limited		Not limited	
PsB:							
Posey	85	Not limited		Not limited		Not limited	
PsC:							
Posey	80	Not limited		Not limited		Somewhat limited	
						Slope	0.88
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
SgA:							
Seagraves	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too sandy	0.17	Too sandy	0.17	Too sandy	0.17
ShB:							
Sharvana	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00	Depth to cemented pan	1.00
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
TkA:							
Tokio	90	Not limited		Not limited		Not limited	
TkB:							
Tokio	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.99	Too sandy	0.99	Too sandy	0.99
W:							
Water	100	Not rated		Not rated		Not rated	

Table 12.—Camp Areas, Picnic Areas, and Playgrounds—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
YeA:							
Yellowlake----------	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
YhE:							
Yellowhouse---------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
		Slow water movement	0.45	Slow water movement	0.45	Slow water movement	0.45
ZmA:							
Zita----------------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50

Table 13.—Paths, Trails, and Golf Course Fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf course fairways: Rating class and limiting features	Value
AcA:							
Acuff	90	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
AcB:							
Acuff	90	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
AfA:							
Amarillo	90	Not limited		Not limited		Not limited	
AfB:							
Amarillo	90	Not limited		Not limited		Not limited	
AfC:							
Amarillo	85	Not limited		Not limited		Not limited	
ArA:							
Arch	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
AvA:							
Arvana	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
						Depth to cemented pan	0.82
AvB:							
Arvana	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
						Depth to cemented pan	0.82
BcA:							
Bippus	80	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
BeC:							
Berda	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
BP:							
Borrow pits	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	0.92			Droughty	1.00
						Slope	1.00
						Gravel content	1.00
						Carbonate content	1.00

Table 13.—Paths, Trails, and Golf Course Fairways—Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BpD:							
Berda	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.01
Potter	30	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
						Droughty	0.43
						Slope	0.01
ChA:							
Chapel	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
CtC:							
Creta	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Sodium content	1.00
DRC:							
Drake	90	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
DRE:							
Drake	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.63
EsA:							
Estacado	90	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
FrA:							
Friona	85	Not limited		Not limited		Somewhat limited	
						Depth to cemented pan	0.35
KmB:							
Kimberson	85	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Carbonate content	1.00
						Droughty	1.00
LDA:							
Levelland	85	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
LDF:							
Landfill	100	Not rated		Not rated		Not rated	
LeA:							
Lenorah	85	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.24	Too sandy	0.24	Sodium content	1.00
						Carbonate content	1.00
						Droughty	0.01

Table 13.—Paths, Trails, and Golf Course Fairways—Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
MdB:							
Midessa	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
MPC:							
Midessa	50	Not limited		Not limited		Very limited	
						Carbonate content	1.00
Posey	35	Not limited		Not limited		Very limited	
						Carbonate content	1.00
NtC:							
Nutivoli	90	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.90
OcA:							
Olton	85	Not limited		Not limited		Not limited	
PAB:							
Patricia	50	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.97	Too sandy	0.97		
Amarillo	45	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.88	Too sandy	0.88		
PeA:							
Pep	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
PeB:							
Pep	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
						Droughty	0.89
						Slope	0.01
PoA:							
Portales	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00

Table 13.—Paths, Trails, and Golf Course Fairways—Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PoB:							
Portales	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00
PsA:							
Posey	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PsB:							
Posey	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PsC:							
Posey	80	Not limited		Not limited		Very limited	
						Carbonate content	1.00
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
SgA:							
Seagraves	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too sandy	0.17	Too sandy	0.17		
ShB:							
Sharvana	85	Not limited		Not limited		Very limited	
						Depth to cemented pan	1.00
						Carbonate content	1.00
						Droughty	1.00
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
TkA:							
Tokio	90	Not limited		Not limited		Not limited	
TkB:							
Tokio	90	Somewhat limited		Somewhat limited		Not limited	
		Too sandy	0.99	Too sandy	0.99		
W:							
Water	100	Not rated		Not rated		Not rated	

Table 13.—Paths, Trails, and Golf Course Fairways—Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf course fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
YeA:							
Yellowlake----------	80	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Carbonate content	1.00
YhE:							
Yellowhouse---------	85	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Slope	1.00
						Carbonate content	1.00
						Gravel content	0.54
						Droughty	0.26
ZmA:							
Zita----------------	90	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Carbonate content	1.00

Table 14.—Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover		Domestic grasses and legumes for food and cover		Irrigated grain and seed crops for food and cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AcA:							
Acuff	90	Somewhat limited		Somewhat limited		Not limited	
		Too arid	0.50	Too arid	0.50		
AcB:							
Acuff	90	Somewhat limited		Somewhat limited		Not limited	
		Too arid	0.50	Too arid	0.50		
AfA:							
Amarillo	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.01
		Droughty	0.01				
AfB:							
Amarillo	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.01
		Droughty	0.01				
AfC:							
Amarillo	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.01
		Droughty	0.01				
ArA:							
Arch	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Droughty	0.64	Too arid	0.50	Droughty	0.64
		Too arid	0.50				
AvA:							
Arvana	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Droughty	0.99	Cemented pan	0.95	Droughty	0.99
		Cemented pan	0.95			Cemented pan	0.95
AvB:							
Arvana	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Droughty	0.99	Cemented pan	0.95	Droughty	0.99
		Cemented pan	0.95			Cemented pan	0.95
BcA:							
Bippus	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Flooding	0.50	Flooding	0.50	Flooding	0.50
		Too clayey	0.01	Too clayey	0.01	Too clayey	0.01
BeC:							
Berda	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.17
		Droughty	0.17				
BP:							
Borrow pits	95	Not rated		Not rated		Not rated	

Table 14.—Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value	Irrigated grain and seed crops for food and cover: Rating class and limiting features	Value
BpD:							
Berda	55	Somewhat limited		Somewhat limited		Very limited	
		Too arid	0.50	Too arid	0.50	Slope	1.00
		Droughty	0.18			Droughty	0.18
Potter	30	Very limited		Very limited		Very limited	
		Too arid	1.00	Too arid	1.00	Droughty	1.00
		Droughty	1.00	Percs slowly	0.93	Slope	1.00
		Percs slowly	0.93	Droughty	0.42	Percs slowly	0.93
ChA:							
Chapel	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Ponding	0.50	Ponding	0.50	Ponding	0.50
		Percs slowly	0.50	Percs slowly	0.50	Percs slowly	0.50
CtC:							
Creta	90	Not limited		Somewhat limited		Not limited	
				Excess sodium	0.08		
DRC:							
Drake	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.43
		Droughty	0.43			Slope	0.12
DRE:							
Drake	90	Somewhat limited		Somewhat limited		Very limited	
		Too arid	0.50	Too arid	0.50	Slope	1.00
		Droughty	0.45			Droughty	0.45
EsA:							
Estacado	90	Somewhat limited		Somewhat limited		Not limited	
		Too arid	0.50	Too arid	0.50		
FrA:							
Friona	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Cemented pan	0.83	Cemented pan	0.83	Cemented pan	0.83
		Droughty	0.59			Droughty	0.59
KmB:							
Kimberson	85	Very limited		Very limited		Very limited	
		Droughty	1.00	Droughty	1.00	Droughty	1.00
		Cemented pan	1.00	Cemented pan	1.00	Cemented pan	1.00
LDA:							
Levelland	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Flooding	0.50	Flooding	0.50	Flooding	0.50
		Too arid	0.50	Too arid	0.50	Droughty	0.26
		Droughty	0.26				
LDF:							
Landfill	100	Not rated		Not rated		Not rated	

Table 14.—Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value	Irrigated grain and seed crops for food and cover: Rating class and limiting features	Value
LeA:							
Lenorah	85	Very limited		Very limited		Very limited	
		Excess salt	1.00	Excess salt	1.00	Excess salt	1.00
		Droughty	1.00	Excess sodium	1.00	Droughty	1.00
		Excess Sodium	0.60	Droughty	0.01	Excess Sodium	0.60
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Percs slowly	1.00	Percs slowly	1.00
		Too clayey	0.70	Too clayey	0.70	Too clayey	0.70
		Ponding	0.50	Ponding	0.50	Ponding	0.50
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.48
		Droughty	0.48				
MdB:							
Midessa	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.46
		Droughty	0.46				
MPC:							
Midessa	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.47
		Droughty	0.47			Slope	0.12
Posey	35	Somewhat limited		Not limited		Somewhat limited	
		Droughty	0.67			Droughty	0.67
						Slope	0.12
NtC:							
Nutivoli	90	Very limited		Somewhat limited		Very limited	
		Droughty	1.00	Droughty	0.89	Droughty	1.00
		Too sandy	1.00	Too sandy	0.50	Too sandy	0.50
		Too arid	0.50	Too arid	0.50	Slope	0.12
OcA:							
Olton	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Too clayey	0.14
		Too clayey	0.14	Too clayey	0.14		
PAB:							
Patricia	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too sandy	0.50	Droughty	0.18
		Too arid	0.50	Too arid	0.50		
		Droughty	0.18				
Amarillo	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too sandy	0.50	Droughty	0.05
		Too arid	0.50	Too arid	0.50		
		Droughty	0.05				

Table 14.—Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover		Domestic grasses and legumes for food and cover		Irrigated grain and seed crops for food and cover	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PeA:							
Pep	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.29
		Droughty	0.29				
PeB:							
Pep	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.37
		Droughty	0.37				
PGE:							
Potter	85	Very limited		Very limited		Very limited	
		Droughty	1.00	Too arid	1.00	Droughty	1.00
		Too arid	1.00	Percs slowly	0.93	Slope	1.00
		Percs slowly	0.93	Droughty	0.89	Percs slowly	0.93
PoA:							
Portales	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.07
		Droughty	0.07				
PoB:							
Portales	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.08
		Droughty	0.08				
PsA:							
Posey	85	Somewhat limited		Not limited		Somewhat limited	
		Droughty	0.62			Droughty	0.62
PsB:							
Posey	85	Somewhat limited		Not limited		Somewhat limited	
		Droughty	0.63			Droughty	0.63
PsC:							
Posey	80	Somewhat limited		Not limited		Somewhat limited	
		Droughty	0.67			Droughty	0.67
						Slope	0.12
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Wetness	1.00	Wetness	1.00	Wetness	1.00
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Percs slowly	0.50	Percs slowly	0.50	Percs slowly	0.50
SgA:							
Seagraves	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Droughty	0.79	Ponding	0.50	Droughty	0.79
		Ponding	0.50			Ponding	0.50

Table 14.—Grain and Seed Crops and Domestic Grasses and Legumes for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Grain and seed crops for food and cover: Rating class and limiting features	Value	Domestic grasses and legumes for food and cover: Rating class and limiting features	Value	Irrigated grain and seed crops for food and cover: Rating class and limiting features	Value
ShB:							
Sharvana	85	Very limited		Very limited		Very limited	
		Droughty	1.00	Cemented pan	1.00	Droughty	1.00
		Cemented pan	1.00	Droughty	1.00	Cemented pan	1.00
		Too arid	0.50	Too arid	0.50		
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
		Ponding	0.50	Ponding	0.50	Ponding	0.50
		Percs slowly	0.50	Percs slowly	0.50	Percs slowly	0.50
TkA:							
Tokio	90	Somewhat limited		Not limited		Somewhat limited	
		Droughty	0.01			Droughty	0.01
TkB:							
Tokio	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too sandy	0.50	Droughty	0.15
		Droughty	0.15				
W:							
Water	100	Not rated		Not rated		Not rated	
YeA:							
Yellowlake	80	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Excess sodium	1.00	Percs slowly	1.00
		Excess salt	1.00	Percs slowly	1.00	Excess salt	1.00
		Excess Sodium	1.00	Excess salt	1.00	Excess Sodium	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Droughty	0.11			Droughty	0.11
YhE:							
Yellowhouse	85	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Percs slowly	1.00	Percs slowly	1.00
		Droughty	1.00	Bedrock	0.71	Droughty	1.00
		Bedrock	0.71	Too gravelly, cobbly, or stony	0.54	Slope	1.00
		Too gravelly, cobbly, or stony	0.54	Too arid	0.50	Bedrock	0.71
		Too arid	0.50	Too clayey	0.44	Too gravelly, cobbly, or stony	0.54
ZmA:							
Zita	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50	Droughty	0.01
		Droughty	0.01				

Table 15.—Upland Herbaceous Plants and Upland Shrubs and Vines for Food and Cover for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants		Upland shrubs and vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
AcA:					
Acuff	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AcB:					
Acuff	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AfA:					
Amarillo	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AfB:					
Amarillo	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AfC:					
Amarillo	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
ArA:					
Arch	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
AvA:					
Arvana	85	Not limited		Somewhat limited	
				Cemented pan	0.95
AvB:					
Arvana	85	Not limited		Somewhat limited	
				Cemented pan	0.95
BcA:					
Bippus	80	Somewhat limited		Somewhat limited	
		Too clayey	0.01	Too clayey	0.01
BeC:					
Berda	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
BP:					
Borrow pits	95	Not rated		Not rated	
BpD:					
Berda	55	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50

Table 15.–Upland Herbaceous Plants and Upland Shrubs and Vines for Food and Cover for Wildlife Habitat–Continued

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants: Rating class and limiting features	Upland wild herbaceous plants: Value	Upland shrubs and vines: Rating class and limiting features	Upland shrubs and vines: Value
Potter	30	Very limited		Very limited	
		Too arid	1.00	Too arid	1.00
		Droughty	0.42	Droughty	0.42
ChA:					
Chapel	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
CtC:					
Creta	90	Somewhat limited		Not limited	
		Excess sodium	0.08		
DRC:					
Drake	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
DRE:					
Drake	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
EsA:					
Estacado	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
FrA:					
Friona	85	Not limited		Somewhat limited	
				Cemented pan	0.83
KmB:					
Kimberson	85	Very limited		Very limited	
		Droughty	1.00	Droughty	1.00
				Cemented pan	1.00
LDA:					
Levelland	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
LDF:					
Landfill	100	Not rated		Not rated	
LeA:					
Lenorah	85	Very limited		Very limited	
		Excess salt	1.00	Excess salt	1.00
		Excess sodium	1.00	Excess Sodium	0.60
		Droughty	0.01	Droughty	0.01
LoA:					
Lofton	85	Somewhat limited		Somewhat limited	
		Too clayey	0.70	Too clayey	0.70

Table 15.—Upland Herbaceous Plants and Upland Shrubs and Vines for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants: Rating class and limiting features	Upland wild herbaceous plants: Value	Upland shrubs and vines: Rating class and limiting features	Upland shrubs and vines: Value
M-W:					
Miscellaneous water	100	Not rated		Not rated	
MdA:					
Midessa	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
MdB:					
Midessa	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
MPC:					
Midessa	50	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
Posey	35	Not limited		Not limited	
NtC:					
Nutivoli	90	Very limited		Somewhat limited	
		Too sandy	1.00	Droughty	0.89
		Droughty	0.89	Too sandy	0.50
		Too arid	0.50	Too arid	0.50
OcA:					
Olton	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
		Too clayey	0.14	Too clayey	0.14
PAB:					
Patricia	50	Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too arid	0.50
		Too arid	0.50		
Amarillo	45	Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too arid	0.50
		Too arid	0.50		
PeA:					
Pep	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
PeB:					
Pep	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
PGE:					
Potter	85	Very limited		Very limited	
		Too arid	1.00	Too arid	1.00
		Droughty	0.89	Droughty	0.89
PoA:					
Portales	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50

Table 15.—Upland Herbaceous Plants and Upland Shrubs and Vines for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants: Rating class and limiting features	Upland wild herbaceous plants: Value	Upland shrubs and vines: Rating class and limiting features	Upland shrubs and vines: Value
PoB:					
Portales	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50
PsA:					
Posey	85	Not limited		Not limited	
PsB:					
Posey	85	Not limited		Not limited	
PsC:					
Posey	80	Not limited		Not limited	
RcA:					
Ranco	90	Very limited		Very limited	
		Wetness	1.00	Too clayey	1.00
		Too clayey	1.00	Wetness	1.00
SgA:					
Seagraves	90	Not limited		Not limited	
ShB:					
Sharvana	85	Very limited		Very limited	
		Droughty	1.00	Cemented pan	1.00
		Too arid	0.50	Droughty	1.00
				Too arid	0.50
SL:					
Water, intermittent, salt lake	100	Not rated		Not rated	
SpA:					
Sparenberg	90	Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00
TkA:					
Tokio	90	Not limited		Not limited	
TkB:					
Tokio	90	Somewhat limited		Not limited	
		Too sandy	0.50		
W:					
Water	100	Not rated		Not rated	

Table 15.—Upland Herbaceous Plants and Upland Shrubs and Vines for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Upland wild herbaceous plants		Upland shrubs and vines	
		Rating class and limiting features	Value	Rating class and limiting features	Value
YeA:					
Yellowlake----------	80	Very limited		Very limited	
		Excess sodium	1.00	Excess salt	1.00
		Excess salt	1.00	Excess Sodium	1.00
		Too clayey	0.50	Too clayey	0.50
YhE:					
Yellowhouse---------	85	Somewhat limited		Somewhat limited	
		Too arid	0.50	Bedrock	0.71
		Too clayey	0.44	Too arid	0.50
		Droughty	0.24	Too clayey	0.44
				Droughty	0.24
ZmA:					
Zita----------------	90	Somewhat limited		Somewhat limited	
		Too arid	0.50	Too arid	0.50

Table 16.—Freshwater Wetland Plants for Food and Cover for Wildlife Habitat

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants	
		Rating class and limiting features	Value
AcA:			
Acuff	90	Very limited	
		Too dry	1.00
AcB:			
Acuff	90	Very limited	
		Too dry	1.00
AfA:			
Amarillo	90	Very limited	
		Too dry	1.00
AfB:			
Amarillo	90	Very limited	
		Too dry	1.00
AfC:			
Amarillo	85	Very limited	
		Too dry	1.00
ArA:			
Arch	90	Very limited	
		Too dry	1.00
		Too alkaline	1.00
AvA:			
Arvana	85	Very limited	
		Too dry	1.00
AvB:			
Arvana	85	Very limited	
		Too dry	1.00

Table 16.—Freshwater Wetland Plants for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
BcA:			
Bippus	80	Very limited	
		Too dry	1.00
BeC:			
Berda	85	Very limited	
		Too dry	1.00
BP:			
Borrow pits	95	Very limited	
		Too dry	1.00
BpD:			
Berda	55	Very limited	
		Too dry	1.00
Potter	30	Very limited	
		Too dry	1.00
		Too alkaline	1.00
ChA:			
Chapel	90	Very limited	
		Too dry	1.00
		Too alkaline	1.00
CtC:			
Creta	90	Very limited	
		Too dry	1.00
DRC:			
Drake	90	Very limited	
		Too dry	1.00
DRE:			
Drake	90	Very limited	
		Too dry	1.00
EsA:			
Estacado	90	Very limited	
		Too dry	1.00

Table 16.—Freshwater Wetland Plants for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
FrA:			
Friona	85	Very limited	
		Too dry	1.00
KmB:			
Kimberson	85	Very limited	
		Too dry	1.00
LDA:			
Levelland	85	Very limited	
		Too dry	1.00
LDF:			
Landfill	100	Not rated	
LeA:			
Lenorah	85	Very limited	
		Too dry	1.00
		Too alkaline	1.00
LoA:			
Lofton	85	Very limited	
		Too dry	1.00
M-W:			
Miscellaneous water	100	Not rated	
MdA:			
Midessa	85	Very limited	
		Too dry	1.00
MdB:			
Midessa	85	Very limited	
		Too dry	1.00
MPC:			
Midessa	50	Very limited	
		Too dry	1.00

Table 16.—Freshwater Wetland Plants for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
Posey	35	Very limited	
		Too dry	1.00
NtC:			
Nutivoli	90	Very limited	
		Too dry	1.00
		Too sandy	0.50
OcA:			
Olton	85	Very limited	
		Too dry	1.00
PAB:			
Patricia	50	Very limited	
		Too dry	1.00
Amarillo	45	Very limited	
		Too dry	1.00
PeA:			
Pep	85	Very limited	
		Too dry	1.00
PeB:			
Pep	85	Very limited	
		Too dry	1.00
PGE:			
Potter	85	Very limited	
		Too dry	1.00
		Too alkaline	1.00
PoA:			
Portales	90	Very limited	
		Too dry	1.00

Table 16.—Freshwater Wetland Plants for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
PoB:			
Portales	90	Very limited	
		Too dry	1.00
PsA:			
Posey	85	Very limited	
		Too dry	1.00
PsB:			
Posey	85	Very limited	
		Too dry	1.00
PsC:			
Posey	80	Very limited	
		Too dry	1.00
RcA:			
Ranco	90	Not limited	
SgA:			
Seagraves	90	Very limited	
		Too dry	1.00
ShB:			
Sharvana	85	Very limited	
		Too dry	1.00
SL:			
Water, intermittent, salt lake	100	Very limited	
		Excess salt	1.00
		Excess sodium	1.00
		Ponding	0.50
SpA:			
Sparenberg	90	Very limited	
		Too dry	1.00

Table 16.—Freshwater Wetland Plants for Food and Cover for Wildlife Habitat—Continued

Map symbol and soil name	Pct. of map unit	Freshwater wetland plants: Rating class and limiting features	Value
TkA:			
Tokio	90	Very limited	
		Too dry	1.00
TkB:			
Tokio	90	Very limited	
		Too dry	1.00
W:			
Water	100	Not rated	
YeA:			
Yellowlake	80	Very limited	
		Too dry	1.00
		Too alkaline	1.00
YhE:			
Yellowhouse	85	Very limited	
		Too dry	1.00
		Too alkaline	1.00
ZmA:			
Zita	90	Very limited	
		Too dry	1.00

Table 17.—Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
AcA:							
Acuff	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.44	Shrink-swell	0.44	Shrink-swell	0.44
AcB:							
Acuff	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.44	Shrink-swell	0.44	Shrink-swell	0.44
AfA:							
Amarillo	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.06	Shrink-swell	0.06	Shrink-swell	0.06
AfB:							
Amarillo	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.06	Shrink-swell	0.06	Shrink-swell	0.06
AfC:							
Amarillo	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.06	Shrink-swell	0.06	Shrink-swell	0.06
ArA:							
Arch	90	Not limited		Not limited		Not limited	
AvA:							
Arvana	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.01	Depth to thin cemented pan	0.82	Shrink-swell	0.01
				Shrink-swell	0.01		
AvB:							
Arvana	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.01	Depth to thin cemented pan	0.82	Shrink-swell	0.01
				Shrink-swell	0.01		
BcA:							
Bippus	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
BeC:							
Berda	85	Not limited		Not limited		Not limited	
BP:							
Borrow pits	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
BpD:							
Berda	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
Potter	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00

Table 17.—Dwellings and Small Commercial Buildings—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ChA:							
Chapel	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	0.27	Shrink-swell	1.00
CtC:							
Creta	90	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.32	Shrink-swell	1.00	Shrink-swell	0.32
DRC:							
Drake	90	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.14			Shrink-swell	0.14
						Slope	0.12
DRE:							
Drake	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.14			Shrink-swell	0.14
EsA:							
Estacado	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.18	Shrink-swell	0.18	Shrink-swell	0.18
FrA:							
Friona	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.18	Depth to thin cemented pan	0.35	Shrink-swell	0.18
				Shrink-swell	0.18		
KmB:							
Kimberson	85	Somewhat limited		Very limited		Somewhat limited	
		Depth to thin cemented pan	0.50	Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00
LDA:							
Levelland	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Shrink-swell	0.27		
LDF:							
Landfill	100	Not rated		Not rated		Not rated	
LeA:							
Lenorah	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.96		
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Not limited		Not limited		Not limited	

Table 17.—Dwellings and Small Commercial Buildings—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
MdB:							
Midessa	85	Not limited		Not limited		Not limited	
MPC:							
Midessa	50	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Posey	35	Not limited		Not limited		Somewhat limited	
						Slope	0.12
NtC:							
Nutivoli	90	Not limited		Not limited		Somewhat limited	
						Slope	0.12
OcA:							
Olton	85	Somewhat limited		Not limited		Very limited	
		Shrink-swell	0.99			Shrink-swell	0.99
PAB:							
Patricia	50	Not limited		Somewhat limited		Not limited	
				Shrink-swell	0.01		
Amarillo	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.01	Shrink-swell	0.01	Shrink-swell	0.01
PeA:							
Pep	85	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.18			Shrink-swell	0.18
PeB:							
Pep	85	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.18			Shrink-swell	0.18
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Slope	1.00
PoA:							
Portales	90	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.18			Shrink-swell	0.18
PoB:							
Portales	90	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.18			Shrink-swell	0.18
PsA:							
Posey	85	Not limited		Not limited		Not limited	
PsB:							
Posey	85	Not limited		Not limited		Not limited	
PsC:							
Posey	80	Not limited		Not limited		Somewhat limited	
						Slope	0.12

Table 17.—Dwellings and Small Commercial Buildings—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
SgA:							
Seagraves	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
				Shrink-swell	0.89		
ShB:							
Sharvana	85	Somewhat limited		Very limited		Somewhat limited	
		Depth to thin cemented pan	0.50	Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00
		Shrink-swell	0.06	Shrink-swell	0.06	Shrink-swell	0.06
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
TkA:							
Tokio	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.14	Shrink-swell	0.82	Shrink-swell	0.14
TkB:							
Tokio	90	Not limited		Somewhat limited		Not limited	
				Shrink-swell	0.82		
W:							
Water	100	Not rated		Not rated		Not rated	
YeA:							
Yellowlake	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.03		
YhE:							
Yellowhouse	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.71		
ZmA:							
Zita	90	Not limited		Not limited		Not limited	

Table 18.—Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AcA:							
Acuff	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.44				
AcB:							
Acuff	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.44				
AfA:							
Amarillo	90	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.06	Cutbanks cave	0.10		
AfB:							
Amarillo	90	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.06	Cutbanks cave	0.10		
AfC:							
Amarillo	85	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.06	Cutbanks cave	0.10		
ArA:							
Arch	90	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
AvA:							
Arvana	85	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.01	Cutbanks cave	1.00	Carbonate content	1.00
				Depth to thin cemented pan	0.82	Depth to cemented pan	0.82
AvB:							
Arvana	85	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.01	Cutbanks cave	1.00	Carbonate content	1.00
				Depth to thin cemented pan	0.82	Depth to cemented pan	0.82
BcA:							
Bippus	80	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
				Cutbanks cave	0.10		
BeC:							
Berda	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		

Table 18.—Roads and Streets, Shallow Excavations, and Lawns and Landscaping—Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BP:							
Borrow pits	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Droughty	1.00
						Slope	1.00
						Gravel content	1.00
						Carbonate content	1.00
BpD:							
Berda	55	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Cutbanks cave	0.10	Slope	0.01
		Slope	0.01	Slope	0.01		
Potter	30	Somewhat limited		Very limited		Very limited	
		Slope	0.01	Cutbanks cave	1.00	Carbonate content	1.00
				Slope	0.01	Droughty	0.43
						Slope	0.01
ChA:							
Chapel	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Low strength	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Shrink-swell	1.00	Too clayey	0.74		
CtC:							
Creta	90	Somewhat limited		Very limited		Very limited	
		Shrink-swell	0.32	Too clayey	1.00	Sodium content	1.00
		Low strength	0.22	Cutbanks cave	0.10		
DRC:							
Drake	90	Somewhat limited		Somewhat limited		Not limited	
		Low strength	0.78	Cutbanks cave	0.10		
		Shrink-swell	0.14				
DRE:							
Drake	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Low strength	0.78	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
		Shrink-swell	0.14				
EsA:							
Estacado	90	Somewhat limited		Somewhat limited		Not limited	
		Low strength	0.22	Cutbanks cave	0.10		
		Shrink-swell	0.18				
FrA:							
Friona	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Low strength	0.78	Depth to thin cemented pan	0.35	Depth to cemented pan	0.35
		Shrink-swell	0.18	Cutbanks cave	0.10		
KmB:							
Kimberson	85	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00	Depth to cemented pan	1.00
				Cutbanks cave	1.00	Carbonate content	1.00
						Droughty	1.00

Table 18.—Roads and Streets, Shallow Excavations, and Lawns and Landscaping—Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
LDA:							
Levelland	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
				Cutbanks cave	0.10		
LDF:							
Landfill	100	Not rated		Not rated		Not rated	
LeA:							
Lenorah	85	Somewhat limited		Very limited		Very limited	
		Flooding	0.20	Cutbanks cave	1.00	Sodium content	1.00
				Depth to saturated zone	0.96	Carbonate content	1.00
						Droughty	0.01
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Low strength	1.00	Too clayey	0.12		
		Shrink-swell	1.00	Cutbanks cave	0.10		
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
MdB:							
Midessa	85	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
MPC:							
Midessa	50	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
Posey	35	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
NtC:							
Nutivoli	90	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.90
OcA:							
Olton	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.99				
PAB:							
Patricia	50	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
Amarillo	45	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.01	Cutbanks cave	0.10		

Table 18.—Roads and Streets, Shallow Excavations, and Lawns and Landscaping—Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PeA:							
Pep	85	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.18				
PeB:							
Pep	85	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.18				
PGE:							
Potter	85	Somewhat limited		Very limited		Very limited	
		Slope	0.01	Cutbanks cave	1.00	Carbonate content	1.00
				Slope	0.01	Droughty	0.89
						Slope	0.01
PoA:							
Portales	90	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.18				
PoB:							
Portales	90	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.18				
PsA:							
Posey	85	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
PsB:							
Posey	85	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
PsC:							
Posey	80	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Carbonate content	1.00
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.61		
SgA:							
Seagraves	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
				Cutbanks cave	1.00		
				Too clayey	0.05		

Table 18.—Roads and Streets, Shallow Excavations, and Lawns and Landscaping—Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
ShB:							
Sharvana	85	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	1.00	Depth to thin cemented pan	1.00	Depth to cemented pan	1.00
		Shrink-swell	0.06	Cutbanks cave	1.00	Carbonate content	1.00
						Droughty	1.00
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	0.50		
TkA:							
Tokio	90	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.14	Cutbanks cave	0.10		
TkB:							
Tokio	90	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
W:							
Water	100	Not rated		Not rated		Not rated	
YeA:							
Yellowlake	80	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Too clayey	1.00	Sodium content	1.00
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
				Depth to saturated zone	0.03		
YhE:							
Yellowhouse	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Carbonate content	1.00
		Low strength	1.00	Too clayey	0.95	Gravel content	0.54
				Depth to soft bedrock	0.71	Droughty	0.26
ZmA:							
Zita	90	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00

Table 19.–Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
AcA:					
Acuff	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AcB:					
Acuff	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AfA:					
Amarillo	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AfB:					
Amarillo	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AfC:					
Amarillo	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
ArA:					
Arch	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
AvA:					
Arvana	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.50	Seepage	0.50
AvB:					
Arvana	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.50	Seepage	0.50
BcA:					
Bippus	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.50	Seepage	0.50

Table 19.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
BeC:					
Berda	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
BP:					
Borrow pits	95	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
BpD:					
Berda	55	Somewhat limited		Very limited	
		Slow water movement	0.50	Slope	1.00
		Slope	0.01	Seepage	0.50
Potter	30	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.01	Seepage	0.50
ChA:					
Chapel	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00		
CtC:					
Creta	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
				Slope	0.08
DRC:					
Drake	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.68
				Seepage	0.50
DRE:					
Drake	90	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Slow water movement	0.50	Seepage	0.50
EsA:					
Estacado	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50

Table 19.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
FrA:					
Friona	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Slow water movement	0.50	Seepage	0.50
KmB:					
Kimberson	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Seepage	0.50
LDA:					
Levelland	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Slow water movement	0.50	Seepage	1.00
LDF:					
Landfill	100	Not rated		Not rated	
LeA:					
Lenorah	85	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50	Flooding	0.20
		Flooding	0.20		
LoA:					
Lofton	85	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00		
M-W:					
Miscellaneous water	100	Not rated		Not rated	
MdA:					
Midessa	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
MdB:					
Midessa	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
MPC:					
Midessa	50	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.68
				Seepage	0.50

Table 19.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
Posey	35	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.68
				Seepage	0.50
NtC:					
Nutivoli	90	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.68
OcA:					
Olton	85	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
PAB:					
Patricia	50	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
Amarillo	45	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
PeA:					
Pep	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
PeB:					
Pep	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
PGE:					
Potter	85	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.01	Seepage	0.50
PoA:					
Portales	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
PoB:					
Portales	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
PsA:					
Posey	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50

Table 19.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
PsB:					
Posey	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50
PsC:					
Posey	80	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Slope	0.68
				Seepage	0.50
RcA:					
Ranco	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
SgA:					
Seagraves	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Slow water movement	1.00	Seepage	1.00
ShB:					
Sharvana	85	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
				Seepage	0.50
SL:					
Water, intermittent, salt lake	100	Not rated		Not rated	
SpA:					
Sparenberg	90	Very limited		Very limited	
		Slow water movement	1.00	Ponding	1.00
		Ponding	1.00		
TkA:					
Tokio	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
TkB:					
Tokio	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		

Table 19.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
W:					
Water	100	Not rated		Not rated	
YeA:					
Yellowlake	80	Very limited		Not limited	
		Slow water movement	1.00		
		Depth to saturated zone	0.08		
YhE:					
Yellowhouse	85	Very limited		Very limited	
		Slow water movement	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
ZmA:					
Zita	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.50	Seepage	0.50

Table 20.—Landfills

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AcA:							
Acuff	90	Not limited		Not limited		Not limited	
AcB:							
Acuff	90	Not limited		Not limited		Not limited	
AfA:							
Amarillo	90	Not limited		Not limited		Not limited	
AfB:							
Amarillo	90	Not limited		Not limited		Not limited	
AfC:							
Amarillo	85	Not limited		Not limited		Not limited	
ArA:							
Arch	90	Not limited		Not limited		Very limited	
						Carbonate content	1.00
AvA:							
Arvana	85	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	0.50	Depth to cemented pan	1.00	Depth to cemented pan	1.00
AvB:							
Arvana	85	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	0.50	Depth to cemented pan	1.00	Depth to cemented pan	1.00
BcA:							
Bippus	80	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
BeC:							
Berda	85	Not limited		Not limited		Not limited	
BP:							
Borrow pits	95	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Slope	1.00	Slope	1.00	Gravel content	1.00
						Slope	1.00
						Carbonate content	1.00
BpD:							
Berda	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.01	Slope	0.01	Slope	0.01
Potter	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Carbonate content	1.00
						Slope	0.01

Table 20.—Landfills—Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
ChA:							
Chapel	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	0.50			Too clayey	0.50
CtC:							
Creta	90	Very limited		Not limited		Very limited	
		Too clayey	1.00			Hard to compact	1.00
		Excess sodium	1.00			Sodium content	1.00
DRC:							
Drake	90	Not limited		Not limited		Not limited	
DRE:							
Drake	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
EsA:							
Estacado	90	Not limited		Not limited		Very limited	
						Carbonate content	1.00
FrA:							
Friona	85	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	0.50	Depth to cemented pan	1.00	Depth to cemented pan	1.00
KmB:							
Kimberson	85	Somewhat limited		Very limited		Very limited	
		Depth to thin cemented pan	0.50	Depth to cemented pan	1.00	Depth to cemented pan	1.00
LDA:							
Levelland	85	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
LDF:							
Landfill	100	Not rated		Very limited		Not rated	
				Seepage	1.00		
LeA:							
Lenorah	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Seepage, bottom layer	1.00	Flooding	0.20	Carbonate content	1.00
		Excess sodium	1.00			Depth to saturated zone	0.12
		Flooding	0.20				
LoA:							
Lofton	85	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00

Table 20.—Landfills—Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
MdB:							
Midessa	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
MPC:							
Midessa	50	Not limited		Not limited		Very limited	
						Carbonate content	1.00
Posey	35	Not limited		Not limited		Not limited	
NtC:							
Nutivoli	90	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
OcA:							
Olton	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PAB:							
Patricia	50	Not limited		Not limited		Not limited	
Amarillo	45	Not limited		Not limited		Not limited	
PeA:							
Pep	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PeB:							
Pep	85	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PGE:							
Potter	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Slope	0.01	Gravel content	1.00
						Carbonate content	1.00
						Slope	0.01
PoA:							
Portales	90	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PoB:							
Portales	90	Not limited		Not limited		Very limited	
						Carbonate content	1.00
PsA:							
Posey	85	Not limited		Not limited		Not limited	

Table 20.—Landfills—Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
PsB:							
Posey	85	Not limited		Not limited		Not limited	
PsC:							
Posey	80	Not limited		Not limited		Not limited	
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
SgA:							
Seagraves	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
				Seepage	1.00		
ShB:							
Sharvana	85	Somewhat limited		Not limited		Very limited	
		Depth to thin cemented pan	0.50			Depth to cemented pan	1.00
SL:							
Water, intermittent, salt lake	100	Not rated		Very limited		Not rated	
				Ponding	1.00		
				Depth to saturated zone	1.00		
SpA:							
Sparenberg	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
TkA:							
Tokio	90	Very limited		Very limited		Somewhat limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Too clayey	0.50
		Too clayey	0.50				
TkB:							
Tokio	90	Very limited		Very limited		Somewhat limited	
		Seepage, bottom layer	1.00	Seepage	1.00	Seepage	0.50
		Too clayey	0.50			Too clayey	0.50
W:							
Water	100	Not rated		Not rated		Not rated	

Table 20.—Landfills—Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
YeA:							
Yellowlake----------	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Excess sodium	1.00			Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
		Excess salt	1.00			Salinity	1.00
YhE:							
Yellowhouse---------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Hard to compact	1.00
						Slope	1.00
						Gravel content	0.01
ZmA:							
Zita----------------	90	Not limited		Not limited		Very limited	
						Carbonate content	1.00

Table 21.—Source of Gravel and Sand

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
AcA:					
Acuff	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AcB:					
Acuff	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AfA:					
Amarillo	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AfB:					
Amarillo	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AfC:					
Amarillo	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ArA:					
Arch	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AvA:					
Arvana	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
AvB:					
Arvana	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BcA:					
Bippus	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
BeC:					
Berda	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 21.—Source of Gravel and Sand—Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
BP:					
Borrow pits	95	Fair		Poor	
		Bottom layer	0.03	Bottom layer	0.00
		Thickest layer	0.03	Thickest layer	0.00
BpD:					
Berda	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Potter	30	Fair		Poor	
		Thickest layer	0.22	Thickest layer	0.00
		Bottom layer	0.38	Bottom layer	0.00
ChA:					
Chapel	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
CtC:					
Creta	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
DRC:					
Drake	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
DRE:					
Drake	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
EsA:					
Estacado	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
FrA:					
Friona	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
KmB:					
Kimberson	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
LDA:					
Levelland	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.04
LDF:					
Landfill	100	Not rated		Not rated	

Table 21.—Source of Gravel and Sand—Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
LeA:					
Lenorah	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.31
LoA:					
Lofton	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
M-W:					
Miscellaneous water	100	Not rated		Not rated	
MdA:					
Midessa	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MdB:					
Midessa	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
MPC:					
Midessa	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Posey	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
NtC:					
Nutivoli	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.08
		Thickest layer	0.00	Bottom layer	0.12
OcA:					
Olton	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PAB:					
Patricia	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.01
Amarillo	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PeA:					
Pep	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 21.—Source of Gravel and Sand—Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel: Rating class	Value	Potential source of sand: Rating class	Value
PeB:					
Pep	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PGE:					
Potter	85	Fair		Poor	
		Thickest layer	0.22	Thickest layer	0.00
		Bottom layer	0.38	Bottom layer	0.00
PoA:					
Portales	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PoB:					
Portales	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PsA:					
Posey	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PsB:					
Posey	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
PsC:					
Posey	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
RcA:					
Ranco	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
SgA:					
Seagraves	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ShB:					
Sharvana	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.05
SL:					
Water, intermittent, salt lake	100	Not rated		Not rated	

Table 21.—Source of Gravel and Sand—Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
SpA:					
Sparenberg----------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
TkA:					
Tokio---------------	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.11
TkB:					
Tokio---------------	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.11
W:					
Water---------------	100	Not rated		Not rated	
YeA:					
Yellowlake----------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
YhE:					
Yellowhouse---------	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
ZmA:					
Zita----------------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 22.—Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
AcA:							
Acuff	90	Poor		Poor		Good	
		Carbonate content	0.00	Low strength	0.00		
				Shrink-swell	0.99		
AcB:							
Acuff	90	Poor		Poor		Good	
		Carbonate content	0.00	Low strength	0.00		
				Shrink-swell	0.99		
AfA:							
Amarillo	90	Poor		Good		Good	
		Carbonate content	0.00				
		Organic matter content low	0.50				
AfB:							
Amarillo	90	Poor		Good		Good	
		Carbonate content	0.00				
		Organic matter content low	0.50				
AfC:							
Amarillo	85	Poor		Good		Good	
		Carbonate content	0.00				
		Organic matter content low	0.50				
ArA:							
Arch	90	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.05
		Too alkaline	0.00			Too clayey	0.54
		Organic matter content low	0.14			Rock fragments	0.92
		Too clayey	0.85				
		Water erosion	0.99				
AvA:							
Arvana	85	Poor		Poor		Fair	
		Carbonate content	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.18
		Depth to cemented pan	0.18				
		Droughty	0.24				
		Organic matter content low	0.98				

Table 22.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AvB:							
Arvana	85	Poor		Poor		Fair	
		Carbonate content	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.18
		Depth to cemented pan	0.18	Shrink-swell	0.99		
		Droughty	0.25				
		Organic matter content low	0.98				
BcA:							
Bippus	80	Fair		Good		Good	
		Organic matter content low	0.88				
BeC:							
Berda	85	Fair		Poor		Fair	
		Organic matter content low	0.18	Low strength	0.00	Too clayey	0.59
BP:							
Borrow pits	95	Poor		Fair		Poor	
		Carbonate content	0.00	Slope	0.08	Carbonate content	0.00
		Droughty	0.01			Slope	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
						Rock fragments	0.00
BpD:							
Berda	55	Fair		Poor		Fair	
		Organic matter content low	0.18	Low strength	0.00	Too clayey	0.59
Potter	30	Poor		Good		Poor	
		Carbonate content	0.00			Rock fragments	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
		Droughty	0.65			Carbonate content	0.00
ChA:							
Chapel	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Too alkaline	0.00	Shrink-swell	0.13		
		Carbonate content	0.00				
		Organic matter content low	0.05				
		Water erosion	0.99				
CtC:							
Creta	90	Fair		Poor		Fair	
		Sodium content	0.40	Low strength	0.00	Sodium content	0.40
		Organic matter content low	0.50	Shrink-swell	0.42		
		Salinity	0.96				
		Carbonate content	0.97				

Table 22.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
DRC:							
Drake	90	Fair		Fair		Good	
		Organic matter content low	0.32				
		Carbonate content	0.95				
DRE:							
Drake	90	Fair		Fair		Fair	
		Organic matter content low	0.32			Slope	0.37
		Too clayey	0.95			Too clayey	0.59
		Carbonate content	0.95				
EsA:							
Estacado	90	Poor		Poor		Good	
		Carbonate content	0.00	Low strength	0.00		
				Shrink-swell	0.99		
FrA:							
Friona	85	Fair		Poor		Fair	
		Carbonate content	0.08	Depth to cemented pan	0.00	Depth to cemented pan	0.65
		Depth to cemented pan	0.65	Low strength	0.22		
		Droughty	0.73	Shrink-swell	0.95		
		Organic matter content low	0.88				
KmB:							
Kimberson	85	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Carbonate content	0.00			Rock fragments	0.68
		Depth to cemented pan	0.00				
LDA:							
Levelland	85	Fair		Good		Good	
		Organic matter content low	0.50				
LDF:							
Landfill	100	Not rated		Not rated		Not rated	
LeA:							
Lenorah	85	Poor		Good		Poor	
		Sodium content	0.00			Salinity	0.00
		Too alkaline	0.00			Sodium content	0.00
		Carbonate content	0.00			Carbonate content	0.84
		Salinity	0.07			Rock fragments	0.88
		Organic matter content low	0.70				

Table 22.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LoA:							
Lofton	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.32	Shrink-swell	0.24		
		Water erosion	0.99				
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.91
		Organic matter content low	0.02				
MdB:							
Midessa	85	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.90
		Organic matter content low	0.02				
MPC:							
Midessa	50	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.86
		Organic matter content low	0.02				
Posey	35	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.05
		Organic matter content low	0.08			Too clayey	0.43
		Too clayey	0.74			Rock fragments	0.95
NtC:							
Nutivoli	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Organic matter content low	0.03				
		Droughty	0.75				
OcA:							
Olton	85	Poor		Poor		Fair	
		Carbonate content	0.00	Low strength	0.00	Too clayey	0.02
		Too clayey	0.02	Shrink-swell	0.83		
		Organic matter content low	0.99				
PAB:							
Patricia	50	Poor		Good		Good	
		Wind erosion	0.00				
		Too alkaline	0.00				
		Carbonate content	0.00				
		Organic matter content low	0.09				

Table 22.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
Amarillo------------	45	Poor		Good		Good	
		Wind erosion	0.00				
		Carbonate content	0.00				
		Organic matter content low	0.50				
PeA:							
Pep-----------------	85	Poor		Poor		Good	
		Carbonate content	0.00	Low strength	0.00		
		Organic matter content low	0.02				
		Water erosion	0.99				
PeB:							
Pep-----------------	85	Poor		Poor		Good	
		Carbonate content	0.00	Low strength	0.00		
		Organic matter content low	0.02				
		Water erosion	0.99				
PGE:							
Potter--------------	85	Poor		Good		Poor	
		Carbonate content	0.00			Rock fragments	0.00
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.00
		Droughty	0.28			Carbonate content	0.00
PoA:							
Portales------------	90	Poor		Poor		Good	
		Carbonate content	0.00	Low strength	0.00		
		Organic matter content low	0.02				
		Water erosion	0.99				
PoB:							
Portales------------	90	Poor		Poor		Fair	
		Carbonate content	0.00	Low strength	0.00		
		Organic matter content low	0.02				
		Water erosion	0.99				
PsA:							
Posey---------------	85	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.11
		Organic matter content low	0.08			Too clayey	0.43
		Too clayey	0.74			Rock fragments	0.95
PsB:							
Posey---------------	85	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.07
		Organic matter content low	0.08			Too clayey	0.43
		Too clayey	0.74			Rock fragments	0.95

Table 22.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
PsC:							
Posey	80	Poor		Good		Fair	
		Carbonate content	0.00			Carbonate content	0.05
		Organic matter content low	0.08			Too clayey	0.43
		Too clayey	0.74			Rock fragments	0.95
RcA:							
Ranco	90	Poor		Poor		Poor	
		Too clayey	0.00	Wetness depth	0.00	Too clayey	0.00
		Organic matter content low	0.32	Low strength	0.00	Wetness depth	0.00
				Shrink-swell	0.00		
SgA:							
Seagraves	90	Fair		Poor		Fair	
		Organic matter content low	0.50	Low strength	0.00	Too sandy	0.70
		Too sandy	0.70				
		Carbonate content	0.99				
ShB:							
Sharvana	85	Poor		Poor		Poor	
		Droughty	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Carbonate content	0.00	Shrink-swell	0.99		
		Depth to cemented pan	0.00				
		Organic matter content low	0.75				
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Organic matter content low	0.68	Shrink-swell	0.00		
TkA:							
Tokio	90	Fair		Poor		Good	
		Organic matter content low	0.29	Low strength	0.00		
		Carbonate content	0.32	Shrink-swell	0.98		
TkB:							
Tokio	90	Poor		Fair		Fair	
		Wind erosion	0.00	Shrink-swell	0.99	Too sandy	0.65
		Organic matter content low	0.29				
		Carbonate content	0.32				
		Too sandy	0.65				

Table 22.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
W:							
Water	100	Not rated		Not rated		Not rated	
YeA:							
Yellowlake	80	Poor		Poor		Poor	
		Sodium content	0.00	Shrink-swell	0.00	Sodium content	0.00
		Salinity	0.00	Low strength	0.00	Too clayey	0.00
		Carbonate content	0.00			Salinity	0.00
		Too alkaline	0.00				
		Too clayey	0.00				
		Organic matter content low	0.54				
YhE:							
Yellowhouse	85	Poor		Poor		Poor	
		Carbonate content	0.00	Low strength	0.00	Slope	0.00
		Too alkaline	0.00	Shrink-swell	0.18	Too clayey	0.00
		Too clayey	0.00	Slope	0.50	Carbonate content	0.02
		Droughty	0.02			Rock fragments	0.82
		Organic matter content low	0.73				
ZmA:							
Zita	90	Poor		Poor		Good	
		Carbonate content	0.00	Low strength	0.00		
		Organic matter content low	0.08				

Table 23.—Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
AcA:							
Acuff	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.24	Depth to water	1.00
AcB:							
Acuff	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.24	Depth to water	1.00
AfA:							
Amarillo	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.37	Depth to water	1.00
AfB:							
Amarillo	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.36	Depth to water	1.00
AfC:							
Amarillo	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.35	Depth to water	1.00
		Slope	0.08				
ArA:							
Arch	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.25	Depth to water	1.00
AvA:							
Arvana	85	Somewhat limited		Somewhat limited		Very limited	
		Depth to cemented pan	0.95	Thin layer	0.95	Depth to water	1.00
		Seepage	0.70				
AvB:							
Arvana	85	Somewhat limited		Somewhat limited		Very limited	
		Depth to cemented pan	0.95	Thin layer	0.95	Depth to water	1.00
		Seepage	0.70	Piping	0.67		
BcA:							
Bippus	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.57	Depth to water	1.00
BeC:							
Berda	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.33	Depth to water	1.00
		Slope	0.08				
BP:							
Borrow pits	95	Very limited		Very limited		Very limited	
		Slope	1.00	Ponding	1.00	Depth to water	1.00
				Seepage	0.03		

Table 23.—Ponds and Embankments—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BpD:							
Berda	55	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.31	Depth to water	1.00
		Seepage	0.70				
Potter	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Seepage	0.38	Depth to water	1.00
ChA:							
Chapel	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.01	Ponding	1.00	Depth to water	1.00
CtC:							
Creta	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Hard to pack	1.00	Depth to water	1.00
				Salinity	0.04		
DRC:							
Drake	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.89	Depth to water	1.00
		Slope	0.32				
DRE:							
Drake	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.87	Depth to water	1.00
		Seepage	1.00				
EsA:							
Estacado	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.03	Depth to water	1.00
FrA:							
Friona	85	Somewhat limited		Somewhat limited		Very limited	
		Depth to cemented pan	0.83	Thin layer	0.83	Depth to water	1.00
		Seepage	0.70	Piping	0.21		
KmB:							
Kimberson	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
		Seepage	0.70	Piping	0.94		
LDA:							
Levelland	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.04	Depth to water	1.00
LDF:							
Landfill	100	Very limited		Not rated		Not rated	
		Seepage	1.00				
LeA:							
Lenorah	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Cutbanks cave	1.00
				Salinity	0.93	Salinity and saturated zone	0.97
				Depth to saturated zone	0.50	Depth to saturated zone	0.22
				Seepage	0.31		

Table 23.—Ponds and Embankments—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LoA:							
Lofton	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.03	Ponding	1.00	Depth to water	1.00
				Hard to pack	0.27		
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.34	Depth to water	1.00
MdB:							
Midessa	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.32	Depth to water	1.00
MPC:							
Midessa	50	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.31	Depth to water	1.00
		Slope	0.32				
Posey	35	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.32				
NtC:							
Nutivoli	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.12	Depth to water	1.00
		Slope	0.32				
OcA:							
Olton	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
PAB:							
Patricia	50	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Seepage	0.01	Depth to water	1.00
Amarillo	45	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
PeA:							
Pep	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.33	Depth to water	1.00
PeB:							
Pep	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.32	Depth to water	1.00
PGE:							
Potter	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Seepage	0.38	Depth to water	1.00
PoA:							
Portales	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.51	Depth to water	1.00

Table 23.—Ponds and Embankments—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PoB:							
Portales	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.50	Depth to water	1.00
PsA:							
Posey	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
PsB:							
Posey	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
PsC:							
Posey	80	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.32				
RcA:							
Ranco	90	Not limited		Very limited		Very limited	
				Ponding	1.00	Slow refill	1.00
				Depth to saturated zone	1.00	Cutbanks cave	0.10
				Hard to pack	0.78		
SgA:							
Seagraves	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Depth to water	1.00
				Piping	0.41		
ShB:							
Sharvana	85	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Thin layer	1.00	Depth to water	1.00
		Seepage	0.70	Seepage	0.40		
SL:							
Water, intermittent, salt lake	100	Somewhat limited		Not rated		Not rated	
		Seepage	0.01				
SpA:							
Sparenberg	90	Not limited		Very limited		Very limited	
				Ponding	1.00	Depth to water	1.00
				Hard to pack	0.95		
TkA:							
Tokio	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.11	Depth to water	1.00
TkB:							
Tokio	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.11	Depth to water	1.00
W:							
Water	100	Not rated		Not rated		Not rated	

Table 23.—Ponds and Embankments—Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
YeA:							
Yellowlake----------	80	Not limited		Very limited		Very limited	
				Salinity	1.00	Depth to water	1.00
				Hard to pack	1.00	Slow refill	1.00
YhE:							
Yellowhouse---------	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Thin layer	0.93	Depth to water	1.00
		Depth to bedrock	0.19	Hard to pack	0.53		
ZmA:							
Zita----------------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.01	Depth to water	1.00

Table 24.—Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
AcA:							
Acuff	90	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
AcB:							
Acuff	90	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.88		
				Slope	0.04		
AfA:							
Amarillo	90	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
AfB:							
Amarillo	90	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.88		
				Slope	0.04		
AfC:							
Amarillo	85	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.37	K factor	0.88		
				Slope	0.37		
ArA:							
Arch	90	Not limited		Very limited		Not limited	
				K factor	1.00		
AvA:							
Arvana	85	Somewhat limited		Somewhat limited		Very limited	
		Thin cemented pan	0.82	K factor	0.88	Expect caving	1.00
				Thin cemented pan	0.82	Thin cemented pan	0.82
AvB:							
Arvana	85	Somewhat limited		Somewhat limited		Very limited	
		Thin cemented pan	0.82	K factor	0.88	Expect caving	1.00
		Slope	0.04	Thin cemented pan	0.82	Thin cemented pan	0.82
				Slope	0.04		
BcA:							
Bippus	80	Not limited		Somewhat limited		Somewhat limited	
				K factor	0.88	Occasional flooding	0.40
BeC:							
Berda	85	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.37	K factor	0.88		
				Slope	0.37		

Table 24.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BP:							
Borrow pits	95	Very limited		Very limited		Not rated	
		Slope	1.00	Ponding	1.00		
				Slope	1.00		
BpD:							
Berda	55	Very limited		Very limited		Not limited	
		Slope	1.00	Slope	1.00		
				K factor	0.88		
Potter	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
ChA:							
Chapel	90	Not limited		Very limited		Very limited	
				Ponding	1.00	Ponding	1.00
				K factor	0.88	Expect caving	1.00
						Too clayey	0.74
CtC:							
Creta	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	K factor	0.88	Too clayey	1.00
				Slope	0.16		
DRC:							
Drake	90	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.63	Slope	0.63		
				K factor	0.50		
DRE:							
Drake	90	Very limited		Very limited		Somewhat limited	
		Slope	1.00	Slope	1.00	Slope	0.63
				K factor	0.50		
EsA:							
Estacado	90	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
FrA:							
Friona	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Thin cemented pan	0.35	K factor	0.88	Thin cemented pan	0.35
				Thin cemented pan	0.35		
KmB:							
Kimberson	85	Very limited		Very limited		Very limited	
		Thin cemented pan	1.00	Thin cemented pan	1.00	Thin cemented pan	1.00
						Expect caving	1.00
LDA:							
Levelland	85	Not limited		Somewhat limited		Somewhat limited	
				K factor	0.12	Occasional flooding	0.40
LDF:							
Landfill	100	Not rated		Not rated		Not rated	

Table 24.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains		Constructing terraces and diversions		Tile drains and underground outlets	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LeA:							
Lenorah	85	Not limited		Somewhat limited		Very limited	
				K factor	0.88	Expect caving	1.00
						Depth to saturated zone	0.96
LoA:							
Lofton	85	Not limited		Very limited		Very limited	
				K factor	1.00	Ponding	1.00
						Too clayey	0.12
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
MdA:							
Midessa	85	Not limited		Somewhat limited		Not limited	
				K factor	0.50		
MdB:							
Midessa	85	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.50		
				Slope	0.04		
MPC:							
Midessa	50	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.63	Slope	0.63		
				K factor	0.50		
Posey	35	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.63	K factor	0.88		
				Slope	0.63		
NtC:							
Nutivoli	90	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Too Sandy	1.00	Expect caving	1.00
				Slope	0.63		
OcA:							
Olton	85	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
PAB:							
Patricia	50	Not limited		Somewhat limited		Not limited	
				K factor	0.50		
Amarillo	45	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
PeA:							
Pep	85	Not limited		Very limited		Not limited	
				K factor	1.00		
PeB:							
Pep	85	Somewhat limited		Very limited		Not limited	
		Slope	0.04	K factor	1.00		
				Slope	0.04		

Table 24.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
PGE:							
Potter	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
PoA:							
Portales	90	Not limited		Very limited		Not limited	
				K factor	1.00		
PoB:							
Portales	90	Somewhat limited		Very limited		Not limited	
		Slope	0.04	K factor	1.00		
				Slope	0.04		
PsA:							
Posey	85	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
PsB:							
Posey	85	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.04	K factor	0.88		
				Slope	0.04		
PsC:							
Posey	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.63	K factor	0.88		
				Slope	0.63		
RcA:							
Ranco	90	Not limited		Very limited		Very limited	
				Ponding	1.00	Ponding	1.00
				Depth to saturated zone	1.00	Depth to saturated zone	1.00
				K factor	0.88	Expect caving	1.00
						Too clayey	0.61
SgA:							
Seagraves	90	Not limited		Somewhat limited		Very limited	
				K factor	0.12	Ponding	1.00
						Expect caving	1.00
						Too clayey	0.05
ShB:							
Sharvana	85	Very limited		Very limited		Very limited	
		Thin cemented pan	1.00	Thin cemented pan	1.00	Thin cemented pan	1.00
		Slope	0.04	K factor	0.88	Expect caving	1.00
				Slope	0.04		
SL:							
Water, intermittent, salt lake	100	Not rated		Not rated		Not rated	
SpA:							
Sparenberg	90	Not limited		Very limited		Very limited	
				Ponding	1.00	Ponding	1.00
				K factor	0.88	Expect caving	1.00
						Too clayey	0.50

Table 24.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Constructing grassed waterways and surface drains: Rating class and limiting features	Value	Constructing terraces and diversions: Rating class and limiting features	Value	Tile drains and underground outlets: Rating class and limiting features	Value
TkA:							
Tokio----------------	90	Not limited		Somewhat limited		Not limited	
				K factor	0.88		
TkB:							
Tokio----------------	90	Not limited		Somewhat limited		Not limited	
				K factor	0.12		
W:							
Water----------------	100	Not rated		Not rated		Not rated	
YeA:							
Yellowlake-----------	80	Not limited		Somewhat limited		Very limited	
				K factor	0.88	Too clayey	1.00
						Depth to saturated zone	0.03
YhE:							
Yellowhouse----------	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Expect caving	1.00
		Depth to soft bedrock	0.71	K factor	0.88	Slope	1.00
				Depth to soft bedrock	0.71	Too clayey	0.95
						Depth to soft bedrock	0.71
ZmA:							
Zita-----------------	90	Not limited		Somewhat limited		Not limited	
				K factor	0.88		

Table 25.—Irrigation Systems Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Irrigation all application methods: Value	Sprinkler irrigation: Rating class and limiting features	Sprinkler irrigation: Value	Drip or trickle irrigation: Rating class and limiting features	Drip or trickle irrigation: Value
AcA:							
Acuff	90	Not limited		Not limited		Not limited	
AcB:							
Acuff	90	Not limited		Not limited		Not limited	
AfA:							
Amarillo	90	Not limited		Not limited		Not limited	
AfB:							
Amarillo	90	Not limited		Not limited		Not limited	
AfC:							
Amarillo	85	Somewhat limited		Not limited		Not limited	
		Slope	0.08				
ArA:							
Arch	90	Not limited		Somewhat limited		Not limited	
				Calcium carbonate	0.50		
AvA:							
Arvana	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Cemented pan	0.95	Cemented pan	0.82	Cemented pan	0.95
		Droughty	0.82	Low water holding capacity	0.14	Excess Sodium	0.10
AvB:							
Arvana	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Cemented pan	0.95	Cemented pan	0.82	Cemented pan	0.95
		Droughty	0.81	Low water holding capacity	0.14	Excess Sodium	0.10
BcA:							
Bippus	80	Somewhat limited		Somewhat limited		Not limited	
		Occasional flooding	0.40	Occasional flooding	0.40		
BeC:							
Berda	85	Somewhat limited		Not limited		Somewhat limited	
		Slope	0.08			Excess Sodium	0.10
BP:							
Borrow pits	95	Not rated		Very limited		Not Rated	
				Low water holding capacity	1.00		
				Slopes, sprinkler irrigation	1.00		
				Drains slowly	0.31		

Table 25.—Irrigation Systems Management—Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
BpD:							
Berda	55	Very limited		Somewhat limited		Somewhat limited	
		Slope	1.00	Slopes, sprinkler irrigation	0.10	Excess Sodium	0.10
		Slopes, sprinkler irrigation	0.10				
Potter	30	Very limited		Somewhat limited		Not limited	
		Percs slowly	1.00	Drains slowly	0.73		
		Slope	1.00	Low water holding capacity	0.70		
		Droughty	0.41	Calcium carbonate	0.50		
		Slopes, sprinkler irrigation	0.10	Slopes, sprinkler irrigation	0.10		
ChA:							
Chapel	90	Very limited		Somewhat limited		Very limited	
		Percs slowly	1.00	Drains slowly	0.99	Ponding	1.00
		Ponding	1.00	Surface clay	0.86		
				Ponding	0.50		
CtC:							
Creta	90	Very limited		Somewhat limited		Very limited	
		Excess Sodium	1.00	Excess Sodium	0.74	Excess Sodium	1.00
				Excess Salt	0.50	Excess salt	1.00
DRC:							
Drake	90	Somewhat limited		Not limited		Not limited	
		Slope	0.32				
DRE:							
Drake	90	Very limited		Somewhat limited		Not limited	
		Slope	1.00	Slopes, sprinkler irrigation	0.78		
		Slopes, sprinkler irrigation	0.78				
EsA:							
Estacado	90	Not limited		Not limited		Not limited	
FrA:							
Friona	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Cemented pan	0.83	Cemented pan	0.35	Cemented pan	0.83
		Droughty	0.31				
KmB:							
Kimberson	85	Very limited		Very limited		Very limited	
		Droughty	1.00	Low water holding capacity	1.00	Cemented pan	1.00
		Cemented pan	1.00	Cemented pan	1.00	Excess Sodium	0.40
		Excess Sodium	0.08				
LDA:							
Levelland	85	Somewhat limited		Somewhat limited		Not limited	
		Occasional flooding	0.40	Occasional flooding	0.40		

Table 25.—Irrigation Systems Management—Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
LDF:							
Landfill	100	Not rated		Not Rated		Not Rated	
LeA:							
Lenorah	85	Very limited		Very limited		Very limited	
		Excess Sodium	1.00	Excess Sodium	1.00	Excess Sodium	1.00
		Depth to saturated zone	0.50	Excess Salt	0.50	Excess salt	1.00
				Low water holding capacity	0.20		
LoA:							
Lofton	85	Very limited		Somewhat limited		Very limited	
		Percs slowly	1.00	Drains slowly	0.99	Ponding	1.00
		Ponding	1.00	Ponding	0.50		
M-W:							
Miscellaneous water	100	Not rated		Not Rated		Not Rated	
MdA:							
Midessa	85	Not limited		Somewhat limited		Not limited	
				Calcium carbonate	0.50		
MdB:							
Midessa	85	Not limited		Somewhat limited		Not limited	
				Calcium carbonate	0.50		
MPC:							
Midessa	50	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.32	Calcium carbonate	0.50		
Posey	35	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.32	Calcium carbonate	0.50		
NtC:							
Nutivoli	90	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.32	Low water holding capacity	0.95		
		Droughty	0.29				
OcA:							
Olton	85	Somewhat limited		Not limited		Not limited	
		Percs slowly	0.38				
PAB:							
Patricia	50	Not limited		Not limited		Not limited	
Amarillo	45	Not limited		Not limited		Not limited	
PeA:							
Pep	85	Not limited		Not limited		Not limited	
PeB:							
Pep	85	Not limited		Not limited		Not limited	

Table 25.—Irrigation Systems Management—Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods: Rating class and limiting features	Value	Sprinkler irrigation: Rating class and limiting features	Value	Drip or trickle irrigation: Rating class and limiting features	Value
PGE:							
Potter	85	Very limited		Somewhat limited		Not limited	
		Percs slowly	1.00	Low water holding capacity	0.94		
		Slope	1.00	Drains slowly	0.73		
		Droughty	0.79	Calcium carbonate	0.50		
		Slopes, sprinkler irrigation	0.10	Slopes, sprinkler irrigation	0.10		
PoA:							
Portales	90	Not limited		Not limited		Not limited	
PoB:							
Portales	90	Not limited		Not limited		Not limited	
PsA:							
Posey	85	Not limited		Somewhat limited		Not limited	
				Calcium carbonate	0.50		
PsB:							
Posey	85	Not limited		Somewhat limited		Not limited	
				Calcium carbonate	0.50		
PsC:							
Posey	80	Somewhat limited		Somewhat limited		Not limited	
		Slope	0.32	Calcium carbonate	0.50		
RcA:							
Ranco	90	Very limited		Very limited		Very limited	
		Percs slowly	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Wetness	1.00
		Depth to saturated zone	1.00	Drains slowly	0.99	Wetness	1.00
				Surface clay	0.88		
SgA:							
Seagraves	90	Very limited		Somewhat limited		Very limited	
		Ponding	1.00	Ponding	0.50	Ponding	1.00
				Low water holding capacity	0.01		
ShB:							
Sharvana	85	Very limited		Very limited		Very limited	
		Droughty	1.00	Low water holding capacity	1.00	Cemented pan	1.00
		Cemented pan	1.00	Cemented pan	1.00	Excess Sodium	0.10
SL:							
Water, intermittent, salt lake	100	Not rated		Not Rated		Not Rated	
SpA:							
Sparenberg	90	Very limited		Somewhat limited		Very limited	
		Percs slowly	1.00	Drains slowly	0.99	Ponding	1.00
		Ponding	1.00	Surface clay	0.55		
				Ponding	0.50		

Table 25.–Irrigation Systems Management–Continued

Map symbol and soil name	Pct. of map unit	Irrigation all application methods		Sprinkler irrigation		Drip or trickle irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TkA:							
Tokio	90	Not limited		Not limited		Not limited	
TkB:							
Tokio	90	Not limited		Not limited		Not limited	
W:							
Water	100	Not rated		Not Rated		Not Rated	
YeA:							
Yellowlake	80	Very limited		Very limited		Very limited	
		Excess Sodium	1.00	Excess Sodium	1.00	Excess Sodium	1.00
		Percs slowly	1.00	Drains slowly	0.99	Excess salt	1.00
				Excess Salt	0.50		
YhE:							
Yellowhouse	85	Very limited		Very limited		Somewhat limited	
		Percs slowly	1.00	Slopes, sprinkler irrigation	1.00	Excess Sodium	0.22
		Slopes, sprinkler irrigation	1.00	Drains slowly	0.99		
		Slope	1.00	Depth to soft bedrock	0.71		
		Droughty	0.99	Low water holding capacity	0.56		
		Bedrock	0.71	Calcium carbonate	0.50		
ZmA:							
Zita	90	Not limited		Somewhat limited		Not limited	
				Calcium carbonate	0.50		

Table 26.—Grape Production With Drip Irrigation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Grape production with drip irrigation: Rating class and limiting features	Value
AcA:			
Acuff	90	Not limited	
AcB:			
Acuff	90	Not limited	
AfA:			
Amarillo	90	Not limited	
AfB:			
Amarillo	90	Not limited	
AfC:			
Amarillo	85	Not limited	
ArA:			
Arch	90	Not limited	
AvA:			
Arvana	85	Somewhat limited	
		Cemented pan	0.95
		Excess Sodium	0.10
AvB:			
Arvana	85	Somewhat limited	
		Cemented pan	0.95
		Excess Sodium	0.10
BcA:			
Bippus	80	Not limited	
BeC:			
Berda	85	Somewhat limited	
		Excess Sodium	0.10
BP:			
Borrow pits	95	Not Rated	
BpD:			
Berda	55	Somewhat limited	
		Excess Sodium	0.10
Potter	30	Not limited	
ChA:			
Chapel	90	Very limited	
		Ponding	1.00

Table 26.—Grape Production With Drip Irrigation—Continued

Map symbol and soil name	Pct. of map unit	Grape production with drip irrigation: Rating class and limiting features	Value
CtC:			
Creta	90	Very limited	
		Excess Sodium	1.00
		Excess salt	1.00
DRC:			
Drake	90	Not limited	
DRE:			
Drake	90	Not limited	
EsA:			
Estacado	90	Not limited	
FrA:			
Friona	85	Somewhat limited	
		Cemented pan	0.83
KmB:			
Kimberson	85	Very limited	
		Cemented pan	1.00
		Excess Sodium	0.40
LDA:			
Levelland	85	Not limited	
LDF:			
Landfill	100	Not Rated	
LeA:			
Lenorah	85	Very limited	
		Excess Sodium	1.00
		Excess salt	1.00
LoA:			
Lofton	85	Very limited	
		Ponding	1.00
M-W:			
Miscellaneous water	100	Not Rated	
MdA:			
Midessa	85	Not limited	
MdB:			
Midessa	85	Not limited	
MPC:			
Midessa	50	Not limited	
Posey	35	Not limited	
NtC:			
Nutivoli	90	Not limited	

Table 26.—Grape Production With Drip Irrigation—Continued

Map symbol and soil name	Pct. of map unit	Grape production with drip irrigation: Rating class and limiting features	Value
OcA:			
Olton	85	Not limited	
PAB:			
Patricia	50	Not limited	
Amarillo	45	Not limited	
PeA:			
Pep	85	Not limited	
PeB:			
Pep	85	Not limited	
PGE:			
Potter	85	Not limited	
PoA:			
Portales	90	Not limited	
PoB:			
Portales	90	Not limited	
PsA:			
Posey	85	Not limited	
PsB:			
Posey	85	Not limited	
PsC:			
Posey	80	Not limited	
RcA:			
Ranco	90	Very limited	
		Ponding	1.00
		Wetness	1.00
		Wetness	1.00
SgA:			
Seagraves	90	Very limited	
		Ponding	1.00
ShB:			
Sharvana	85	Very limited	
		Cemented pan	1.00
		Excess Sodium	0.10
SL:			
Water, intermittent, salt lake	100	Not Rated	
SpA:			
Sparenberg	90	Very limited	
		Ponding	1.00

Table 26.—Grape Production With Drip Irrigation—Continued

Map symbol and soil name	Pct. of map unit	Grape production with drip irrigation: Rating class and limiting features	Value
TkA:			
Tokio	90	Not limited	
TkB:			
Tokio	90	Not limited	
W:			
Water	100	Not Rated	
YeA:			
Yellowlake	80	Very limited	
		Excess Sodium	1.00
		Excess salt	1.00
YhE:			
Yellowhouse	85	Somewhat limited	
		Excess Sodium	0.22
ZmA:			
Zita	90	Not limited	

Table 27.—Engineering Soil Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
AcA:												
Acuff	0-12	Loam	CL, SC-SM	A-6	0	0	100	100	92-100	58-72	27-43	8-18
	12-41	Sandy clay loam, clay loam, loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	91-100	57-69	32-45	13-22
	41-58	Sandy clay loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	90-97	80-95	73-95	51-74	31-40	12-14
	58-80	Sandy clay loam, clay loam, loam	CL, SC-SM	A-6, A-7-6	0	0	93-99	86-98	78-98	51-76	31-45	13-21
AcB:												
Acuff	0-11	Loam	CL, SC-SM	A-6	0	0	100	100	92-100	58-72	27-43	8-18
	11-41	Sandy clay loam, clay loam, loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	91-100	57-69	32-45	13-22
	41-58	Sandy clay loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	90-97	80-95	73-95	51-74	31-40	12-14
	58-80	Sandy clay loam, clay loam, loam	CL, SC-SM	A-6, A-7-6	0	0	93-99	86-98	78-98	51-76	31-45	13-21
AfA:												
Amarillo	0-10	Fine sandy loam	SC-SM	A-4	0	0	100	100	92-100	39-49	22-33	6-13
	10-41	Sandy clay loam, clay loam	SC, CL	A-6, A-7-6	0	0	100	100	94-100	48-63	30-46	13-24
	41-56	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	90-98	81-97	66-97	38-65	27-42	9-17
	56-80	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	95-99	90-98	77-98	42-66	29-45	11-21
AfB:												
Amarillo	0-9	Fine sandy loam	SC-SM	A-4	0	0	100	100	92-100	39-49	22-33	6-13
	9-40	Sandy clay loam, clay loam	SC, CL	A-6, A-7-6	0	0	100	100	94-100	48-63	30-46	13-24
	40-56	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	90-98	81-97	66-97	38-65	27-42	9-17
	56-80	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	95-99	90-98	77-98	42-66	29-45	11-21
AfC:												
Amarillo	0-9	Fine sandy loam	SC-SM	A-4	0	0	100	100	92-100	39-49	22-33	6-13
	9-40	Sandy clay loam, clay loam	SC, CL	A-6, A-7-6	0	0	100	100	94-100	48-63	30-46	13-24
	40-56	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	90-98	81-97	66-97	38-65	27-42	9-17
	56-80	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	95-99	90-98	77-98	42-66	29-45	11-21

Table 27.—Engineering Soil Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
ArA:												
Arch	0-6	Loam	CL-ML	A-6	0	0	97-100	94-100	84-100	50-68	24-40	7-19
	6-16	Sandy clay loam, clay loam, loam, fine sandy loam	SC, CL	A-6	0	0	97-100	94-100	84-100	41-61	28-47	12-25
	16-37	Sandy clay loam, clay loam, loam	SC, CL	A-6	0	0	89-98	79-95	64-93	33-56	27-45	12-25
	37-80	Sandy clay loam, clay loam, loam	SC, CL	A-6	0	0	89-98	79-95	62-91	31-54	27-45	12-25
AvA:												
Arvana	0-11	Fine sandy loam	SC-SM	A-4	0	0	98-100	98-100	91-99	40-46	22-28	6-10
	11-26	Sandy clay loam, loam	SC, SC-SM, CL	A-4, A-6	0	0	96-100	95-100	83-100	41-63	26-46	10-24
	26-37	Cemented material			---	---	---	---	---	---	---	---
	37-80	Very gravelly loam, loam, sandy clay loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	35-93	29-92	25-92	16-67	27-37	6-13
AvB:												
Arvana	0-9	Fine sandy loam	SC-SM	A-4	0	0	98-100	98-100	91-99	40-46	22-28	6-10
	9-26	Sandy clay loam, loam	SC, SC-SM, CL	A-4, A-6	0	0	96-100	95-100	83-100	41-63	26-46	10-24
	26-37	Cemented material			---	---	---	---	---	---	---	---
	37-80	Very gravelly loam, loam, sandy clay loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	35-93	29-92	25-92	16-67	27-37	6-13
BcA:												
Bippus	0-14	Clay loam	CL, SC-SM	A-6	0	0	97-100	95-100	81-100	52-75	27-49	9-24
	14-65	Sandy clay loam, clay loam, loam	CL, SC, SC-SM	A-6, A-7-6	0	0	98-100	97-100	91-100	49-66	30-45	13-24
	65-80	Fine sandy loam, clay loam, loam, sandy clay loam	CL, CL-ML, SC-SM, SC	A-4, A-6	0	0	93-100	87-100	83-100	38-69	21-42	5-22
BeC:												
Berda	0-7	Loam	CL-ML	A-6	0	0	79-98	77-98	70-98	41-67	23-39	7-17
	7-22	Loam, sandy clay loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	80-100	78-100	75-100	46-76	27-44	11-22
	22-52	Clay loam, sandy clay loam, loam	CL, SC, SC-SM	A-6, A-7-6	0	0	80-98	78-98	68-98	44-72	27-42	11-20
	52-80	Sandy clay loam, loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	80-95	78-95	68-95	40-64	26-41	9-18

Table 27.—Engineering Soil Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
BP:												
Borrow pits	0-20	Paragravel,	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	40-95	11-91	8-89	4-56	25-44	7-25
	20-80	Paragravel, gravelly fine sandy loam, gravelly loam, very gravelly fine sandy loam, very gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	40-95	11-91	8-89	4-56	25-44	7-25
BpD:												
Berda	0-6	Loam	CL-ML	A-6	0	0	79-98	77-98	70-98	41-67	23-39	7-17
	6-20	Loam, sandy clay loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	80-100	78-100	75-100	46-76	27-44	11-22
	20-52	Clay loam, sandy clay loam, loam	CL, SC, SC-SM	A-6, A-7-6	0	0	80-98	78-98	68-98	44-72	27-42	11-20
	52-80	Sandy clay loam, loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	80-95	78-95	68-95	40-64	26-41	9-18
Potter	0-6	Gravelly loam	ML, GM, SC-SM	A-6	0	0	68-88	64-87	58-87	40-70	31-54	11-24
	6-15	Very gravelly fine sandy loam, very gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	46-63	39-58	27-53	18-39	25-45	7-25
	15-29	Very gravelly fine sandy loam, very gravelly loam, extremely gravelly fine sandy loam, extremely gravelly loam	GC, GC-GM	A-2-4, A-2-6	0	0	19-64	13-60	9-54	6-39	25-44	7-25
	29-80	Extremely gravelly fine sandy loam, extremely gravelly loam, very gravelly fine sandy loam, very gravelly loam	GP-GC, GC-GM, GC	A-2-4, A-2-6	0	0	19-64	13-60	11-59	6-37	25-44	7-25
ChA:												
Chapel	0-5	Clay	CH	A-7-6	0	0	100	100	92-100	79-99	51-76	29-43
	5-14	Clay	CH	A-7-6	0	0	100	100	92-100	75-95	50-73	29-44
	14-35	Clay	CH	A-7-6	0	0	100	100	92-100	78-98	49-69	27-40
	35-80	Clay loam, clay, loam	CL, CH	A-7-6, A-6	0	0	92-100	90-100	79-100	52-84	23-51	5-22

Table 27.—Engineering Soil Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CtC:												
Creta	0-8	Very fine sandy loam	SM, SC-SM, CL-ML	A-4	0	0	76-98	74-98	62-98	33-68	24-36	6-13
	8-27	Sandy clay loam, clay loam	SC, CL	A-6, A-7-6	0	0	83-98	82-98	71-98	40-69	27-45	10-20
	27-44	Sandy clay loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	84-98	83-98	72-98	44-72	35-46	16-19
	44-70	Clay, silty clay	CH, CL	A-7-6	0	0	83-100	81-100	73-100	60-98	49-73	27-46
	70-80	Bedrock			---	---	---	---	---	---	---	---
DRC:												
Drake	0-15	Loam	CL-ML	A-4	0	0	100	100	87-100	46-68	21-36	4-13
	15-28	Sandy clay loam, fine sandy loam, loam, clay loam	SC, SC-SM, SM, CL-ML	A-6, A-7-6, A-4	0	0	100	100	89-100	46-70	27-45	9-20
	28-69	Loam, fine sandy loam, sandy clay loam, clay loam	CL-ML, SC, SC-SM, SM	A-6, A-7-6, A-4	0	0	100	100	90-100	47-70	27-45	9-20
	69-80	Fine sandy loam, loam, sandy clay loam, clay loam	SM, SC, SC-SM, CL-ML	A-4, A-6, A-7-6	0	0	100	100	90-100	46-69	26-45	6-20
DRE:												
Drake	0-14	Loam	CL-ML	A-4	0	0	100	100	87-100	46-68	21-36	4-13
	14-28	Sandy clay loam, fine sandy loam, loam, clay loam	SC, SC-SM, SM, CL-ML	A-6, A-7-6, A-4	0	0	100	100	89-100	46-70	27-45	9-20
	28-69	Loam, fine sandy loam, sandy clay loam, clay loam	CL-ML, SC, SC-SM, SM	A-6, A-7-6, A-4	0	0	100	100	90-100	47-70	27-45	9-20
	69-80	Fine sandy loam, loam, sandy clay loam, clay loam	SM, SC, SC-SM, CL-ML	A-4, A-6, A-7-6	0	0	100	100	90-100	46-69	26-45	6-20
EsA:												
Estacado	0-6	Loam	CL-ML, CL	A-6, A-4	0	0	99-100	98-100	89-100	53-68	26-45	8-19
	6-38	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	99-100	98-100	87-100	45-63	29-49	12-25
	38-50	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	94-100	91-100	79-100	39-58	29-47	13-25
	50-80	Clay loam, sandy clay loam	CL, SC, SC-SM	A-7-6, A-6	0	0	90-99	87-98	68-98	43-73	29-55	13-32

Table 27.—Engineering Soil Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
FrA:												
Friona----------	0-8	Loam	CL	A-6	0	0	100	100	93-100	56-70	25-43	7-18
	8-31	Sandy clay loam, clay loam, loam	CL	A-6	0	0	100	100	90-100	47-70	28-46	12-24
	31-35	Cemented material			---	---	---	---	---	---	0-14	NP
	35-80	Sandy clay loam, clay loam, paragravelly sandy clay loam, paragravelly clay loam	CL	A-6	0	0	73-93	71-92	62-92	33-67	28-49	11-26
KmB:												
Kimberson-------	0-11	Gravelly loam	GC-GM	A-6	0	0	62-89	58-88	55-88	39-64	28-37	9-15
	11-28	Cemented material			---	---	---	---	---	---	---	---
	28-64	Extremely gravelly fine sandy loam, extremely gravelly loam, very gravelly fine sandy loam, very gravelly loam	GP-GM, GC-GM, GM	A-1-a, A-2-4	0	0	14-49	9-45	7-43	3-24	19-31	2-8
	64-80	Cemented material			---	---	---	---	---	---	---	---
LDA:												
Levelland-------	0-31	Fine sandy loam	SC-SM	A-4	0	0	100	100	93-100	32-44	19-32	4-12
	31-45	Fine sandy loam	SC-SM	A-4	0	0	100	100	90-100	33-45	19-32	4-12
	45-70	Sandy clay loam, fine sandy loam	SC, SM	A-6, A-4	0	0	100	100	85-100	35-62	20-46	4-24
	70-80	Fine sandy loam, loamy fine sand	SM, SC-SM	A-2-4, A-4	0	0	89-100	86-100	75-100	22-43	0-28	NP-9
LDF:												
Landfill--------	0-80	Variable			---	---	---	---	---	---	---	---
LeA:												
Lenorah---------	0-8	Fine sandy loam	SC-SM	A-4	0	0	98-100	98-100	87-100	32-47	20-33	4-12
	8-22	Sandy clay loam, loam, fine sandy loam	SC, SC-SM, CL	A-6, A-7-6	0	0	98-100	98-100	88-100	43-58	29-46	12-23
	22-47	Sandy clay loam, loam, fine sandy loam	SC, SC-SM, CL	A-6, A-4	0	0	82-97	78-96	70-96	32-53	28-43	10-19
	47-65	Loamy fine sand, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0	98-100	96-100	81-100	21-38	16-30	1-11
	65-80	Sand, loamy fine sand	SP-SM, SC-SM, SM	A-2-4	0	0	98-100	97-100	68-86	11-21	0-21	NP-4

Table 27.–Engineering Soil Properties–Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number–: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
LoA:												
Lofton----------	0-9	Clay loam	CL	A-7-6	0	0	100	100	95-100	72-82	42-55	21-28
	9-38	Clay, silty clay	CH	A-7-6	0	0	100	100	95-100	77-87	51-62	29-35
	38-52	Clay, silty clay, clay loam	CH, CL	A-7-6, A-6	0	0	100	94-100	81-100	64-88	40-59	21-33
	52-80	Silty clay, clay, clay loam	CL, CH	A-7-6, A-6	0	0	100	83-96	72-96	65-95	37-53	18-26
M-W:												
Miscellaneous water----------	---	---	---	---	---	---	---	---	---	---	---	---
MdA:												
Midessa---------	0-10	Fine sandy loam	SC-SM	A-4	0	0	97-100	96-100	89-100	40-52	21-32	6-12
	10-30	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	96-100	94-100	82-100	41-61	27-41	11-19
	30-60	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	85-97	80-96	61-95	31-59	25-40	7-19
	60-80	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	87-97	83-96	68-96	33-59	25-41	8-18
MdB:												
Midessa---------	0-9	Fine sandy loam	SC-SM	A-4	0	0	97-100	96-100	89-100	40-52	21-32	6-12
	9-30	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	96-100	94-100	82-100	41-61	27-41	11-19
	30-60	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	85-97	80-96	61-95	31-59	25-40	7-19
	60-80	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	87-97	83-96	68-96	33-59	25-41	8-18
MPC:												
Midessa---------	0-7	Fine sandy loam	SC-SM	A-4	0	0	97-100	96-100	89-100	40-52	21-32	6-12
	7-29	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	96-100	94-100	82-100	41-61	27-41	11-19
	29-60	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	85-97	80-96	61-95	31-59	25-40	7-19
	60-80	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	87-97	83-96	68-96	33-59	25-41	8-18
Posey-----------	0-8	Fine sandy loam	SC-SM	A-4	0	0	97-100	96-100	83-98	33-46	20-31	4-10
	8-15	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	94-100	91-100	81-100	39-58	29-42	11-19
	15-37	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	83-94	77-91	64-91	35-64	27-48	8-23
	37-80	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	88-97	84-97	70-97	34-58	29-45	11-20

Table 27.–Engineering Soil Properties–Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number– 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
NtC:												
Nutivoli	0-6	Fine sand	SM	A-2-4	0	0	100	100	93-97	16-20	0-19	NP-3
	6-40	Loamy fine sand, fine sand	SM	A-2-4	0	0	100	100	89-96	20-27	0-22	NP-6
	40-80	Fine sand, loamy fine sand	SM	A-2-4	0	0	100	100	91-98	14-21	0-22	NP-6
OcA:												
Olton	0-8	Clay loam	CL	A-7-6	0	0	100	100	96-100	73-84	40-54	19-27
	8-31	Clay loam, clay	CL, CH	A-7-6, A-6	0	0	100	100	87-100	65-88	38-62	19-36
	31-48	Clay loam, silty clay loam	CL, CH	A-7-6, A-6	0	0	96-100	95-100	83-100	61-77	37-49	18-26
	48-80	Clay loam, silty clay loam	CL, CH	A-6, A-7-6	0	0	83-97	78-97	67-96	48-72	33-43	14-21
PAB:												
Patricia	0-12	Loamy fine sand	SM	A-2-4	0	0	100	100	90-99	16-32	0-25	NP-7
	12-40	Sandy clay loam, fine sandy loam	SC, SC-SM	A-6, A-7-6	0	0	100	100	87-100	33-61	29-45	12-25
	40-78	Sandy clay loam, fine sandy loam	SC, SC-SM	A-6, A-7-6	0	0	100	100	87-100	38-61	28-44	12-24
	78-80	Clay loam, sandy clay loam, fine sandy loam	CL, SC, SC-SM	A-6, A-4	0	0	93-100	90-100	74-100	47-74	26-39	9-14
Amarillo	0-16	Loamy fine sand	SM	A-2-4	0	0	100	100	92-100	25-33	16-25	1-7
	16-53	Sandy clay loam, clay loam	SC, CL	A-6, A-7-6	0	0	100	100	93-100	42-54	29-41	12-20
	53-68	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	90-98	81-97	67-96	32-54	25-37	8-18
	68-80	Sandy clay loam, clay loam	SC, CL	A-7-6, A-6	0	0	95-99	90-98	77-98	36-56	28-40	10-18
PeA:												
Pep	0-10	Loam	ML, CL	A-6	0	0	100	100	93-100	56-67	28-42	9-16
	10-16	Loam, clay loam, silty clay loam	ML, CL, SC-SM	A-6, A-7-6	0	0	100	100	89-100	55-75	27-45	9-21
	16-32	Clay loam, loam, silty clay loam	CL-ML, CL, SC-SM	A-6, A-7-6	0	0	95-100	93-100	78-100	51-75	26-42	9-19
	32-80	Clay loam, loam, silty clay loam	CL-ML, CL, SC-SM	A-6, A-7-6, A-4	0	0	88-97	84-97	65-97	41-72	24-45	7-19

Table 27.—Engineering Soil Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PeB:												
Pep	0-9	Loam	ML, CL	A-6	0	0	100	100	93-100	56-67	28-42	9-16
	9-15	Loam, clay loam, silty clay loam	ML, CL, SC-SM	A-6, A-7-6	0	0	100	100	89-100	55-75	27-45	9-21
	15-30	Clay loam, loam, silty clay loam	CL-ML, CL, SC-SM	A-6, A-7-6	0	0	95-100	93-100	78-100	51-75	26-42	9-19
	30-80	Clay loam, loam, silty clay loam	CL-ML, CL, SC-SM	A-6, A-7-6, A-4	0	0	88-97	84-97	65-97	41-72	24-45	7-19
PGE:												
Potter	0-6	Gravelly loam	ML, GM, SC-SM	A-6	0	0	68-88	64-87	58-87	40-70	31-54	11-24
	6-15	Very gravelly fine sandy loam, very gravelly loam	GC, GC-GM, SC-SM, SC	A-2-4, A-2-6	0	0	46-63	39-58	27-53	18-39	25-45	7-25
	15-29	Very gravelly fine sandy loam, very gravelly loam, extremely gravelly fine sandy loam, extremely gravelly loam	GC, GC-GM	A-2-4, A-2-6	0	0	19-64	13-60	9-54	6-39	25-44	7-25
	29-80	Extremely gravelly fine sandy loam, extremely gravelly loam, very gravelly fine sandy loam, very gravelly loam	GP-GC, GC-GM, GC	A-2-4, A-2-6	0	0	19-64	13-60	11-59	6-37	25-44	7-25
PoA:												
Portales	0-15	Loam	CL	A-6	0	0	100	100	94-100	60-70	27-39	9-15
	15-35	Clay loam, sandy clay loam, loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	91-100	64-84	31-50	12-23
	35-43	Loam, clay loam, sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	86-99	83-98	77-98	53-82	28-44	11-19
	43-80	Clay loam, loam, sandy clay loam	CL, SC-SM, CL-ML	A-6, A-7-6	0	0	81-97	77-96	62-96	41-71	26-44	8-18
PoB:												
Portales	0-14	Loam	CL	A-6	0	0	100	100	94-100	60-70	27-39	9-15
	14-35	Clay loam, sandy clay loam, loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	91-100	64-84	31-50	12-23
	35-43	Loam, clay loam, sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	86-99	83-98	77-98	53-82	28-44	11-19
	43-80	Clay loam, loam, sandy clay loam	CL, SC-SM, CL-ML	A-6, A-7-6	0	0	81-97	77-96	62-96	41-71	26-44	8-18

Table 27.–Engineering Soil Properties–Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number–: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PsA:												
Posey-----------	0-11	Fine sandy loam	SC-SM	A-4	0	0	97-100	96-100	83-98	33-46	20-31	4-10
	11-19	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	94-100	91-100	81-100	39-58	29-42	11-19
	19-39	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	83-94	77-91	64-91	35-64	27-48	8-23
	39-80	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	88-97	84-97	70-97	34-58	29-45	11-20
PsB:												
Posey-----------	0-10	Fine sandy loam	SC-SM	A-4	0	0	97-100	96-100	83-98	33-46	20-31	4-10
	10-18	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	94-100	91-100	81-100	39-58	29-42	11-19
	18-39	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	83-94	77-91	64-91	35-64	27-48	8-23
	39-80	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	88-97	84-97	70-97	34-58	29-45	11-20
PsC:												
Posey-----------	0-8	Fine sandy loam	SC-SM	A-4	0	0	97-100	96-100	83-98	33-46	20-31	4-10
	8-15	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6, A-7-6	0	0	94-100	91-100	81-100	39-58	29-42	11-19
	15-37	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	83-94	77-91	64-91	35-64	27-48	8-23
	37-80	Sandy clay loam, clay loam	SC, CL, SC-SM	A-6	0	0	88-97	84-97	70-97	34-58	29-45	11-20
RcA:												
Ranco-----------	0-9	Clay	CH	A-7-6, A-8	0	0	100	100	85-100	71-91	53-77	29-43
	9-25	Clay	CH	A-7-6, A-8	0	0	100	100	91-100	70-80	51-64	29-34
	25-61	Clay	CH	A-7-6, A-8	0	0	100	100	92-100	70-80	51-63	29-34
	61-80	Clay	CH	A-7-6, A-8	0	0	100	100	88-100	69-84	51-67	29-36
SgA:												
Seagraves-------	0-25	Fine sandy loam	SC-SM	A-4	0	0	100	100	96-100	38-50	19-32	4-13
	25-39	Loamy fine sand, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0	100	100	95-100	34-49	16-31	2-13
	39-57	Sandy clay loam, clay loam, clay	SC, CL, CH	A-6, A-7-6	0	0	100	100	92-100	48-73	31-55	14-33
	57-80	Clay, clay loam, sandy clay loam	CH, CL, SC	A-7-6, A-6	0	0	95-100	93-100	75-100	46-74	36-58	17-33

Table 27.–Engineering Soil Properties–Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number–: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
ShB:												
Sharvana	0-6	Fine sandy loam	SC, SC-SM	A-6	0	0	91-100	90-100	76-99	24-41	18-33	3-13
	6-16	Sandy clay loam	SC, SC-SM	A-6	0	0	91-100	90-100	78-100	34-54	28-45	12-24
	16-36	Cemented material			---	---	---	---	---	---	---	---
	36-80	Extremely gravelly sandy loam, extremely gravelly loam, sandy loam, loam	GP-GM, SC-SM, GC-GM	A-1-a	0	0	10-90	10-90	7-83	3-44	19-31	2-8
SL:												
Water, intermittent, salt lake	0-80	Variable			---	---	---	---	---	---	---	---
SpA:												
Sparenberg	0-4	Clay	CH	A-7-6, A-8	0	0	100	100	89-100	78-93	52-74	29-41
	4-10	Clay	CH	A-7-6, A-8	0	0	100	100	90-100	76-91	52-72	29-41
	10-61	Clay	CH	A-7-6, A-8	0	0	100	100	90-100	77-92	51-70	29-41
	61-80	Clay	CH	A-7-6, A-8	0	0	100	100	90-100	79-94	51-68	29-40
TkA:												
Tokio	0-9	Fine sandy loam	SC	A-2-6	0	0	98-100	90-100	78-100	17-34	21-32	6-13
	9-22	Fine sandy loam, very fine sandy loam	SC-SM, SC	A-2-4, A-4	0	0	100	100	82-100	28-61	19-31	4-13
	22-34	Sandy clay loam, clay loam	SC, SC-SM, CL	A-6, A-7-6	0	0	100	100	89-100	40-63	31-45	13-24
	34-57	Clay loam, sandy clay loam, clay	CL, SC, SC-SM	A-7-6, A-6	0	0	94-100	87-100	76-99	44-77	30-52	13-27
	57-80	Fine sandy loam, sandy clay loam, clay loam	SM, SC, SC-SM, CL-ML	A-2-4, A-4	0	0	91-100	82-99	73-96	20-77	18-39	3-15
TkB:												
Tokio	0-11	Loamy fine sand	SM	A-2-4	0	0	98-100	90-100	78-100	17-34	16-25	2-7
	11-26	Fine sandy loam, very fine sandy loam	SC-SM, SC	A-2-4, A-4	0	0	100	100	82-100	28-61	19-31	4-13
	26-35	Sandy clay loam, clay loam	SC, SC-SM, CL	A-6, A-7-6	0	0	100	100	89-100	40-63	31-45	13-24
	35-57	Clay loam, sandy clay loam, clay	CL, SC, SC-SM	A-7-6, A-6	0	0	94-100	87-100	76-99	44-77	30-52	13-27
	57-80	Fine sandy loam, sandy clay loam, clay loam	SM, SC, SC-SM, CL-ML	A-2-4, A-4	0	0	91-100	82-99	73-96	20-77	18-39	3-15
W:												
Water	---	---	---	---	---	---	---	---	---	---	---	---

Table 27.—Engineering Soil Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
YeA:												
Yellowlake------	0-14	Silty clay loam	CL, CH	A-7-6	0	0	100	100	94-100	84-96	44-58	18-20
	14-22	Clay, silty clay	CH, CL	A-7-6	0	0	100	100	75-100	74-100	49-78	22-39
	22-45	Clay, silty clay loam, silty clay	CH, CL	A-7-6, A-6	0	0	100	100	64-100	62-100	39-77	15-44
	45-66	Clay, silty clay	CH, CL	A-7-6	0	0	100	100	72-100	71-100	48-77	22-44
	66-80	Clay, silty clay	CH, CL	A-7-6	0	0	100	100	72-100	72-100	48-77	22-44
YhE:												
Yellowhouse-----	0-5	Gravelly clay loam	GC	A-7-6	0	0	55-95	40-90	30-85	20-75	39-54	19-26
	5-10	Clay loam, clay, gravelly clay loam, gravelly clay	CL, CH, GC, GM	A-7-6, A-7	0	0	75-99	60-90	50-85	40-75	38-59	19-31
	10-22	Clay, clay loam, gravelly clay, gravelly clay loam	CH, CL, GC, GC-GM	A-7-6, A-7	0	0	84-99	60-90	50-85	40-75	42-63	21-35
	22-27	Gravelly clay, clay	CH, CL, GC, GC-GM	A-7-6, A-8	0	0	71-99	50-90	40-85	40-75	45-72	25-45
	27-80	Bedrock			---	---	---	---	---	---	---	---
ZmA:												
Zita------------	0-18	Loam	CL-ML, CL	A-6, A-7-6	0	0	100	98-100	86-100	52-69	25-44	7-19
	18-24	Clay loam, loam, silty clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	98-100	84-100	59-77	29-48	12-24
	24-35	Clay loam, loam, sandy clay loam	CL, SC-SM	A-6, A-4	0	0	89-96	79-91	60-91	39-74	26-54	9-27
	35-80	Clay loam, loam, sandy clay loam	CL, SC-SM	A-6, A-4	0	0	88-95	76-90	57-90	35-71	26-54	9-27

Table 28.—Physical Soil Properties

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
AcA:														
Acuff	0-12	35-52	15-40	13-27	1.20-1.55	0.6-2	0.14-0.18	1.9-2.9	1.5-3.0	.28	.28	5	6	48
	12-41	30-60	15-30	20-32	1.40-1.60	0.6-2	0.13-0.17	2.9-4.9	0.8-1.5	.32	.32			
	41-58	25-50	15-40	25-40	1.40-1.60	0.6-2	0.08-0.12	0.5-2.9	0.1-0.2	.32	.32			
	58-80	30-60	15-40	22-40	1.30-1.58	0.6-2	0.10-0.14	1.9-3.9	0.1-0.3	.32	.32			
AcB:														
Acuff	0-11	35-52	15-40	13-27	1.20-1.55	0.6-2	0.14-0.18	1.9-2.9	1.5-3.0	.28	.28	5	6	48
	11-41	30-60	15-30	20-32	1.40-1.60	0.6-2	0.13-0.17	2.9-4.9	0.8-1.5	.32	.32			
	41-58	25-50	15-40	25-40	1.40-1.60	0.6-2	0.08-0.12	0.5-2.9	0.1-0.2	.32	.32			
	58-80	30-60	15-40	22-40	1.30-1.58	0.6-2	0.10-0.14	1.9-3.9	0.1-0.3	.32	.32			
AfA:														
Amarillo	0-10	52-80	10-25	10-20	1.30-1.60	2-6	0.12-0.16	0.5-2.9	0.5-1.0	.24	.24	5	3	86
	10-41	30-70	10-35	20-35	1.40-1.65	0.6-2	0.13-0.16	1.9-4.9	0.2-0.8	.32	.32			
	41-56	30-70	5-35	20-40	1.40-1.65	0.6-2	0.08-0.13	0.5-2.9	0.1-0.3	.32	.32			
	56-80	30-70	5-35	20-40	1.40-1.65	0.6-2	0.10-0.15	1.9-3.9	0.1-0.3	.32	.32			
AfB:														
Amarillo	0-9	52-80	10-25	10-20	1.30-1.60	2-6	0.12-0.16	0.5-2.9	0.5-1.0	.24	.24	5	3	86
	9-40	30-70	10-35	20-35	1.40-1.65	0.6-2	0.13-0.16	1.9-4.9	0.2-0.8	.32	.32			
	40-56	30-70	5-35	20-40	1.40-1.65	0.6-2	0.08-0.13	0.5-2.9	0.1-0.3	.32	.32			
	56-80	30-70	5-35	20-40	1.40-1.65	0.6-2	0.10-0.15	1.9-3.9	0.1-0.3	.32	.32			
AfC:														
Amarillo	0-9	52-80	10-25	10-20	1.30-1.60	2-6	0.12-0.16	0.5-2.9	0.5-1.0	.24	.24	5	3	86
	9-40	30-70	10-35	20-35	1.40-1.65	0.6-2	0.13-0.16	1.9-4.9	0.2-0.8	.32	.32			
	40-56	30-70	5-35	20-40	1.40-1.65	0.6-2	0.08-0.13	0.5-2.9	0.1-0.3	.32	.32			
	56-80	30-70	5-35	20-40	1.40-1.65	0.6-2	0.10-0.15	1.9-3.9	0.1-0.3	.32	.32			
ArA:														
Arch	0-6	30-52	15-45	12-27	1.30-1.55	0.6-2	0.10-0.16	0.9-4.9	0.5-1.0	.37	.37	3	4L	86
	6-16	25-70	5-45	18-35	1.40-1.70	0.6-2	0.10-0.15	0.9-4.9	0.1-1.0	.32	.32			
	16-37	25-70	5-45	18-35	1.40-1.70	0.6-2	0.09-0.13	0.0-3.9	0.1-0.5	.32	.32			
	37-80	25-70	5-45	18-35	1.40-1.70	0.6-2	0.09-0.13	0.0-3.9	0.1-0.5	.32	.32			
AvA:														
Arvana	0-11	55-85	5-30	10-15	1.30-1.60	2-6	0.11-0.16	0.5-1.9	0.5-1.0	.24	.24	2	3	86
	11-26	35-70	5-40	15-35	1.45-1.65	0.6-2	0.12-0.18	1.9-4.9	0.1-1.0	.32	.32			
	26-37	---	---	---	---	0.00-0.1	---	---	---	---	---			
	37-80	25-70	10-45	18-35	1.40-1.70	0.6-2	0.08-0.12	0.0-1.9	0.1-0.3	.32	.32			

Table 28.–Physical Soil Properties–Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
AvB:														
Arvana	0-9	55-85	5-30	10-15	1.30-1.60	2-6	0.11-0.16	0.5-1.9	0.5-1.0	.24	.24	2	3	86
	9-26	35-70	5-40	15-35	1.45-1.65	0.6-2	0.12-0.18	1.9-4.9	0.1-1.0	.32	.32			
	26-37	---	---	---	---	0.00-0.1	---	---	---	---	---			
	37-80	25-70	10-45	18-35	1.40-1.70	0.6-2	0.08-0.12	0.0-1.9	0.1-0.3	.32	.32			
BcA:														
Bippus	0-14	25-70	10-45	15-35	1.40-1.60	0.6-2	0.15-0.20	0.5-3.0	1.0-3.0	.28	.28	5	6	48
	14-65	25-70	10-45	20-35	1.40-1.65	0.6-2	0.15-0.20	1.0-3.0	0.5-1.0	.32	.32			
	65-80	25-80	10-45	10-35	1.40-1.65	0.6-2	0.12-0.18	1.0-2.0	0.1-0.5	.24	.24			
BeC:														
Berda	0-7	25-55	15-45	12-27	1.40-1.60	0.6-2	0.10-0.17	0.5-2.9	0.5-1.5	.28	.28	5	4L	86
	7-22	25-70	15-45	18-35	1.40-1.60	0.6-2	0.10-0.17	0.5-3.9	0.1-0.8	.32	.32			
	22-52	25-70	15-45	18-35	1.40-1.60	0.6-2	0.08-0.17	0.5-3.9	0.1-0.5	.32	.32			
	52-80	25-70	15-45	18-35	1.40-1.55	0.6-2	0.08-0.17	0.5-3.9	0.1-0.5	.32	.32			
BP:														
Pits, borrow	0-20	30-75	10-40	15-35	1.40-1.65	0.06-2	0.03-0.09	0.0-2.9	0.1-0.4	.10	.32	1	8	0
	20-80	30-75	10-40	15-35	1.40-1.65	0.06-2	0.03-0.09	0.0-2.9	0.1-0.4	.10	.32			
BpD:														
Berda	0-6	25-55	15-45	12-27	1.40-1.60	0.6-2	0.10-0.17	0.5-2.9	0.5-1.5	.28	.28	5	4L	86
	6-20	25-70	15-45	18-35	1.40-1.60	0.6-2	0.10-0.17	0.5-3.9	0.1-0.8	.32	.32			
	20-52	25-70	15-45	18-35	1.40-1.60	0.6-2	0.08-0.17	0.5-3.9	0.1-0.5	.32	.32			
	52-80	25-70	15-45	18-35	1.40-1.55	0.6-2	0.08-0.17	0.5-3.9	0.1-0.5	.32	.32			
Potter	0-6	30-75	10-40	18-35	1.35-1.60	0.6-2	0.08-0.17	0.0-2.9	2.0-5.0	.15	.32	1	8	0
	6-15	30-75	10-40	15-35	1.40-1.65	0.6-2	0.04-0.15	0.0-2.9	0.4-1.0	.10	.32			
	15-29	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.09	0.0-2.9	0.1-0.4	.10	.32			
	29-80	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.09	0.0-2.9	0.1-0.4	.10	.32			
ChA:														
Chapel	0-5	10-30	15-40	40-60	1.20-1.40	0.00-0.06	0.11-0.18	6.0-12.0	1.0-3.0	.32	.32	5	7	38
	5-14	15-30	15-40	40-60	1.10-1.30	0.00-0.06	0.11-0.18	6.0-12.0	0.5-1.5	.32	.32			
	14-35	15-30	15-40	40-60	1.00-1.30	0.00-0.06	0.11-0.18	6.0-12.0	0.2-1.0	.32	.32			
	35-80	20-45	20-50	15-50	1.10-1.40	0.00-0.6	0.11-0.18	1.9-5.9	0.1-0.3	.37	.37			
CtC:														
Creta	0-8	50-75	10-40	10-20	1.30-1.60	2-6	0.08-0.18	0.5-2.9	1.5-2.5	.32	.32	3	3	86
	8-27	35-65	10-28	15-35	1.30-1.70	0.6-2	0.10-0.18	2.9-5.9	0.5-1.0	.32	.32			
	27-44	35-65	10-28	25-40	1.30-1.70	0.6-2	0.08-0.17	2.9-5.9	0.3-0.8	.32	.32			
	44-70	5-30	10-40	40-65	1.00-1.50	0.06-0.2	0.08-0.14	6.9-14.0	0.1-0.8	.32	.32			
	70-80	---	---	---	---	0.00-0.06	0.00-0.00	---	---	---	---			

Table 28.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
DRC:														
Drake	0-15	30-52	5-40	10-27	1.30-1.55	0.6-6	0.10-0.15	0.5-2.9	0.5-1.5	.28	.28	4	4L	86
	15-28	30-70	5-40	18-40	1.60-1.65	0.6-6	0.09-0.15	1.9-4.9	0.1-0.5	.28	.28			
	28-69	30-70	8-40	18-40	1.60-1.65	0.6-6	0.09-0.15	1.9-4.9	0.1-0.5	.28	.28			
	69-80	30-70	8-40	18-40	1.60-1.65	0.6-6	0.09-0.13	0.5-3.9	0.1-0.5	.28	.28			
DRE:														
Drake	0-14	30-52	5-40	10-27	1.30-1.55	0.6-6	0.10-0.15	0.5-2.9	0.5-1.5	.28	.28	4	4L	86
	14-28	30-70	5-40	18-40	1.60-1.65	0.6-6	0.09-0.15	1.9-4.9	0.1-0.5	.28	.28			
	28-69	30-70	8-40	18-40	1.60-1.65	0.6-6	0.09-0.15	1.9-4.9	0.1-0.5	.28	.28			
	69-80	30-70	8-40	18-40	1.60-1.65	0.6-6	0.09-0.13	0.5-3.9	0.1-0.5	.28	.28			
EsA:														
Estacado	0-6	30-52	10-45	13-27	1.35-1.50	0.6-2	0.12-0.18	0.0-5.9	1.5-3.0	.28	.28	5	5	56
	6-38	30-60	15-30	20-32	1.40-1.60	0.6-2	0.13-0.17	0.0-5.9	0.8-1.5	.32	.32			
	38-50	25-65	15-30	20-35	1.40-1.60	0.6-2	0.10-0.15	0.0-5.9	0.1-0.8	.32	.32			
	50-80	25-65	7-45	20-45	1.40-1.60	0.6-2	0.10-0.12	0.0-5.9	0.1-0.5	.32	.32			
FrA:														
Friona	0-8	30-52	30-45	12-27	1.25-1.50	0.6-2	0.12-0.18	0.5-2.9	1.5-3.0	.28	.28	2	5	56
	8-31	30-65	5-40	18-35	1.40-1.60	0.6-2	0.12-0.18	0.5-4.9	0.5-1.0	.32	.32			
	31-35	0-0	0-0	0-0	---	0.00-0.1	---	---	0.0-0.0	---	---			
	35-80	27-70	5-40	20-45	1.50-1.70	0.6-2	0.07-0.15	0.0-1.9	0.1-0.4	.32	.32			
KmB:														
Kimberson	0-11	35-70	20-45	15-20	1.35-1.45	0.6-2	0.08-0.18	0.5-2.9	1.5-3.5	.20	.37	1	5	56
	11-28	---	---	---	---	0.00-0.01	---	---	---	---	---			
	28-64	35-75	15-45	10-25	1.35-1.45	0.6-2	0.05-0.11	0.0-1.9	0.1-0.8	.05	.24			
	64-80	---	---	---	---	0.00-0.01	---	---	---	---	---			
LDA:														
Levelland	0-31	53-80	3-15	8-20	1.40-1.60	2-6	0.09-0.15	0.5-2.9	0.2-0.8	.24	.24	5	3	86
	31-45	53-80	5-25	8-20	1.40-1.60	2-6	0.10-0.18	0.5-2.9	0.3-0.9	.28	.28			
	45-70	53-80	5-25	8-35	1.40-1.60	0.6-6	0.10-0.18	1.9-4.9	0.2-0.8	.32	.32			
	70-80	53-90	3-25	3-20	1.40-1.60	2-20	0.10-0.15	0.5-1.9	0.1-0.5	.28	.28			
LDF:														
Dumps, sanitary landfill	0-80	---	---	---	---	0.06-20	---	---	---	---	---	--	---	---

Table 28.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
LeA:														
Lenorah-------------	0-8	52-82	8-20	8-20	1.35-1.60	2-6	0.10-0.15	0.5-2.9	0.5-1.5	.24	.24	4	3	86
	8-22	35-82	8-35	18-35	1.20-1.65	0.6-2	0.04-0.14	1.9-4.9	0.5-1.0	.32	.32			
	22-47	35-82	8-35	18-35	1.20-1.65	0.6-2	0.04-0.14	1.9-3.9	0.5-1.0	.32	.32			
	47-65	35-90	4-20	5-20	1.25-1.65	2-20	0.04-0.15	0.0-1.9	0.1-0.5	.17	.17			
	65-80	80-98	1-10	3-10	1.45-1.70	6-34	0.02-0.10	0.0-0.9	0.1-0.3	.15	.15			
LoA:														
Lofton--------------	0-9	15-40	20-50	30-40	1.20-1.40	0.2-0.6	0.14-0.20	2.9-5.9	1.5-3.0	.32	.32	5	6	48
	9-38	15-35	20-50	40-50	1.25-1.45	0.00-0.06	0.12-0.18	5.9-8.9	0.8-1.5	.37	.37			
	38-52	15-35	20-50	30-50	1.30-1.50	0.00-0.06	0.12-0.16	4.9-8.9	0.1-0.8	.37	.37			
	52-80	5-25	30-55	30-50	1.30-1.50	0.2-0.6	0.10-0.13	1.9-3.9	0.1-0.5	.32	.32			
M-W:														
Water, miscellaneous	---	---	---	---	---	---	---	---	---	---	---	--	---	---
MdA:														
Midessa-------------	0-10	55-75	10-20	10-20	1.35-1.55	2-6	0.10-0.15	0.5-2.9	0.2-1.0	.24	.24	3	3	86
	10-30	30-65	8-25	18-35	1.30-1.50	0.6-2	0.11-0.16	0.5-2.9	0.1-0.5	.28	.28			
	30-60	30-65	5-25	18-40	1.35-1.55	0.6-2	0.05-0.13	0.5-1.9	0.1-0.2	.28	.28			
	60-80	30-65	5-25	18-40	1.35-1.55	0.6-2	0.09-0.15	0.5-2.9	0.1-0.2	.28	.28			
MdB:														
Midessa-------------	0-9	55-75	10-20	10-20	1.35-1.55	2-6	0.10-0.15	0.5-2.9	0.2-1.0	.24	.24	3	3	86
	9-30	30-65	8-25	18-35	1.30-1.50	0.6-2	0.11-0.16	0.5-2.9	0.1-0.5	.28	.28			
	30-60	30-65	5-25	18-40	1.35-1.55	0.6-2	0.05-0.13	0.5-1.9	0.1-0.2	.28	.28			
	60-80	30-65	5-25	18-40	1.35-1.55	0.6-2	0.09-0.15	0.5-2.9	0.1-0.2	.28	.28			
MPC:														
Midessa-------------	0-7	55-75	10-20	10-20	1.35-1.55	2-6	0.10-0.15	0.5-2.9	0.2-1.0	.24	.24	3	3	86
	7-29	30-65	8-25	18-35	1.30-1.50	0.6-2	0.11-0.16	0.5-2.9	0.1-0.5	.28	.28			
	29-60	30-65	5-25	18-40	1.35-1.55	0.6-2	0.05-0.13	0.5-1.9	0.1-0.2	.28	.28			
	60-80	30-65	5-25	18-40	1.35-1.55	0.6-2	0.09-0.15	0.5-2.9	0.1-0.2	.28	.28			
Posey---------------	0-8	52-80	10-25	8-20	1.40-1.55	2-6	0.10-0.15	0.5-2.9	0.5-1.0	.24	.24	3	3	86
	8-15	30-70	10-40	20-35	1.40-1.55	0.6-2	0.11-0.17	1.9-4.9	0.1-0.5	.32	.32			
	15-37	30-70	10-40	20-45	1.40-1.55	0.6-2	0.09-0.13	0.5-2.9	0.1-0.5	.32	.32			
	37-80	30-70	10-40	20-40	1.45-1.60	0.6-2	0.10-0.14	1.9-3.9	0.1-0.5	.32	.32			
NtC:														
Nutivoli------------	0-6	88-98	---	3-7	1.35-1.45	6-20	0.04-0.10	0.0-1.0	0.1-0.5	.15	.15	5	1	250
	6-40	80-98	---	3-10	1.50-1.60	6-20	0.04-0.09	0.0-1.0	0.1-0.5	.17	.17			
	40-80	80-98	---	3-10	1.50-1.60	6-20	0.04-0.09	0.0-1.0	0.1-0.5	.17	.17			

Table 28.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
OcA:														
Olton----------------	0-8	25-45	20-45	27-38	1.25-1.55	0.6-2	0.14-0.20	3.9-6.9	1.5-3.0	.32	.32	5	6	48
	8-31	25-45	20-45	27-50	1.25-1.55	0.2-0.6	0.11-0.18	3.9-7.9	0.5-1.5	.32	.32			
	31-48	10-45	20-60	27-40	1.25-1.55	0.2-0.6	0.12-0.18	2.9-5.9	0.4-0.8	.32	.32			
	48-80	10-45	20-60	27-40	1.35-1.65	0.6-2	0.10-0.15	0.5-3.9	0.1-0.3	.32	.32			
PAB:														
Patricia------------	0-12	70-90	3-18	3-12	1.38-1.58	6-20	0.06-0.15	0.0-1.5	0.5-0.9	.17	.17	5	2	134
	12-40	50-75	4-30	18-35	1.45-1.65	0.6-2	0.12-0.17	1.9-3.9	0.3-0.7	.28	.28			
	40-78	50-75	4-30	18-35	1.45-1.65	0.6-2	0.12-0.17	1.9-3.9	0.1-0.4	.28	.28			
	78-80	25-65	15-45	18-40	1.45-1.65	0.6-2	0.05-0.11	0.0-1.9	0.0-0.1	.28	.28			
Amarillo------------	0-13	75-90	3-25	4-12	1.30-1.60	6-20	0.11-0.15	0.0-1.9	0.4-0.9	.17	.17	5	2	134
	13-53	30-70	8-30	18-35	1.40-1.65	0.6-2	0.13-0.16	1.9-3.9	0.2-0.8	.32	.32			
	53-68	30-70	8-30	18-35	1.40-1.65	0.6-2	0.08-0.13	0.5-2.9	0.1-0.3	.32	.32			
	68-80	30-70	8-30	18-35	1.40-1.65	0.6-2	0.10-0.15	1.9-2.9	0.1-0.3	.32	.32			
PeA:														
Pep------------------	0-10	30-52	25-45	15-26	1.30-1.60	0.6-2	0.12-0.18	1.9-4.9	1.0-3.0	.37	.37	4	4L	86
	10-16	20-52	25-60	15-35	1.40-1.70	0.6-2	0.11-0.16	2.9-4.9	0.5-1.5	.37	.37			
	16-32	20-52	25-60	15-35	1.40-1.70	0.6-2	0.10-0.15	2.9-4.9	0.1-0.5	.32	.32			
	32-80	20-52	25-60	15-40	1.40-1.70	0.6-2	0.07-0.12	0.5-5.9	0.1-0.3	.32	.32			
PeB:														
Pep------------------	0-9	30-52	25-45	15-26	1.30-1.60	0.6-2	0.12-0.18	1.9-4.9	1.0-3.0	.37	.37	4	4L	86
	9-15	20-52	25-60	15-35	1.40-1.70	0.6-2	0.11-0.16	2.9-4.9	0.5-1.5	.37	.37			
	15-30	20-52	25-60	15-35	1.40-1.70	0.6-2	0.10-0.15	2.9-4.9	0.1-0.5	.32	.32			
	30-80	20-52	25-60	15-40	1.40-1.70	0.6-2	0.07-0.12	0.5-5.9	0.1-0.3	.32	.32			
PGE:														
Potter---------------	0-6	30-75	10-40	18-35	1.35-1.60	0.6-2	0.10-0.16	0.0-2.9	2.0-5.0	.15	.32	1	8	0
	6-15	30-75	10-40	15-35	1.40-1.65	0.6-2	0.04-0.10	0.0-2.9	0.4-1.0	.10	.32			
	15-29	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
	29-80	30-75	10-40	15-35	1.40-1.65	0.01-0.1	0.03-0.08	0.0-2.9	0.1-0.4	.10	.32			
PoA:														
Portales------------	0-15	35-52	25-45	15-25	1.30-1.55	0.6-2	0.12-0.18	0.5-2.9	1.0-2.5	.37	.37	4	4L	86
	15-35	30-45	25-40	20-40	1.40-1.50	0.6-2	0.11-0.17	1.9-4.9	0.8-2.0	.32	.32			
	35-43	30-45	25-40	20-40	1.40-1.50	0.6-2	0.10-0.15	0.5-4.9	0.1-0.3	.37	.37			
	43-80	30-45	25-40	20-40	1.40-1.50	0.6-2	0.05-0.12	0.0-3.9	0.1-0.2	.32	.32			

Table 28.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
PoB:														
Portales	0-14	35-52	25-45	15-25	1.30-1.55	0.6-2	0.12-0.18	0.5-2.9	1.0-2.5	.37	.37	4	4L	86
	14-35	30-45	25-40	20-40	1.40-1.50	0.6-2	0.11-0.17	1.9-4.9	0.8-2.0	.32	.32			
	35-43	30-45	25-40	20-40	1.40-1.50	0.6-2	0.10-0.15	0.5-4.9	0.1-0.3	.37	.37			
	43-80	30-45	25-40	20-40	1.40-1.50	0.6-2	0.05-0.12	0.0-3.9	0.1-0.2	.32	.32			
PsA:														
Posey	0-11	52-80	10-25	8-20	1.40-1.55	2-6	0.10-0.15	0.5-2.9	0.5-1.0	.24	.24	3	3	86
	11-19	30-70	10-40	20-35	1.40-1.55	0.6-2	0.11-0.17	1.9-4.9	0.1-0.5	.32	.32			
	19-39	30-70	10-40	20-45	1.40-1.55	0.6-2	0.09-0.13	0.5-2.9	0.1-0.5	.32	.32			
	39-80	30-70	10-40	20-40	1.45-1.60	0.6-2	0.10-0.14	1.9-3.9	0.1-0.5	.32	.32			
PsB:														
Posey	0-10	52-80	10-25	8-20	1.40-1.55	2-6	0.10-0.15	0.5-2.9	0.5-1.0	.24	.24	3	3	86
	10-18	30-70	10-40	20-35	1.40-1.55	0.6-2	0.11-0.17	1.9-4.9	0.1-0.5	.32	.32			
	18-39	30-70	10-40	20-45	1.40-1.55	0.6-2	0.09-0.13	0.5-2.9	0.1-0.5	.32	.32			
	39-80	30-70	10-40	20-40	1.45-1.60	0.6-2	0.10-0.14	1.9-3.9	0.1-0.5	.32	.32			
PsC:														
Posey	0-8	52-80	10-25	8-20	1.40-1.55	2-6	0.10-0.15	0.5-2.9	0.5-1.0	.24	.24	3	3	86
	8-15	30-70	10-40	20-35	1.40-1.55	0.6-2	0.11-0.17	1.9-4.9	0.1-0.5	.32	.32			
	15-37	30-70	10-40	20-45	1.40-1.55	0.6-2	0.09-0.13	0.5-2.9	0.1-0.5	.32	.32			
	37-80	30-70	10-40	20-40	1.45-1.60	0.6-2	0.10-0.14	1.9-3.9	0.1-0.5	.32	.32			
RcA:														
Ranco	0-9	10-40	10-40	40-60	1.00-1.25	0.00-0.06	0.12-0.18	8.0-15.0	1.5-3.0	.32	.32	5	7	38
	9-25	10-40	10-40	40-50	1.10-1.35	0.00-0.06	0.11-0.18	8.0-15.0	0.2-1.0	.32	.32			
	25-61	10-40	10-40	40-50	1.20-1.45	0.00-0.06	0.11-0.18	8.0-15.0	0.1-0.8	.32	.32			
	61-80	10-40	10-40	40-55	1.20-1.45	0.00-0.06	0.11-0.17	8.0-15.0	0.1-0.8	.32	.32			
SgA:														
Seagraves	0-25	53-85	5-25	8-20	1.35-1.60	2-6	0.07-0.15	0.0-1.9	0.3-1.0	.24	.24	5	3	86
	25-39	53-88	5-25	5-20	1.35-1.60	6-20	0.07-0.15	0.0-1.9	0.1-0.8	.17	.17			
	39-57	25-70	10-35	20-45	1.35-1.60	0.06-2	0.11-0.18	3.9-6.9	0.1-0.5	.32	.32			
	57-80	25-70	10-35	25-50	1.30-1.55	0.06-2	0.11-0.18	3.9-7.9	0.1-0.5	.32	.32			
ShB:														
Sharvana	0-6	55-85	5-30	6-20	1.35-1.55	2-6	0.09-0.15	0.0-2.9	0.5-1.0	.24	.24	1	3	86
	6-16	50-70	8-20	18-35	1.30-1.60	0.6-2	0.11-0.17	0.0-3.9	0.5-0.9	.32	.32			
	16-36	---	---	---	---	0.00-0.01	---	---	---	---	---			
	36-80	30-80	10-30	8-25	1.30-1.50	0.6-2	0.05-0.15	0.0-2.9	0.2-0.7	.17	.32			
SL:														
Water, intermittent, salt lake	0-80	---	---	---	---	0.00-2	0.02-0.06	---	---	---	---	--	---	---

Table 28.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
SpA:														
Sparenberg----------	0-4	10-40	10-40	40-55	1.10-1.30	0.00-0.06	0.12-0.18	7.0-15.0	1.5-3.0	.32	.32	5	7	38
	4-10	10-40	10-40	40-55	1.10-1.30	0.00-0.06	0.12-0.18	8.0-15.0	0.5-2.0	.32	.32			
	10-61	10-40	10-40	40-55	1.10-1.30	0.00-0.06	0.11-0.18	8.0-15.0	0.1-1.0	.32	.32			
	61-80	10-40	10-40	40-55	1.10-1.30	0.00-0.06	0.11-0.17	8.0-15.0	0.1-0.5	.32	.32			
TkA:														
Tokio---------------	0-9	55-80	---	10-20	1.50-1.70	2-6	0.09-0.15	0.0-1.9	0.5-1.2	.24	.24	5	3	86
	9-22	55-80	2-30	8-20	1.30-1.60	2-6	0.11-0.17	0.0-1.9	0.2-0.5	.24	.24			
	22-34	25-75	6-40	20-35	1.30-1.54	0.6-2	0.12-0.18	2.9-4.9	0.1-0.5	.32	.32			
	34-57	20-75	8-40	20-45	1.10-1.41	0.6-2	0.11-0.14	1.9-5.9	0.1-0.5	.32	.32			
	57-80	20-85	5-45	8-35	1.40-1.70	0.6-6	0.07-0.14	0.0-3.9	0.1-0.3	.28	.28			
TkB:														
Tokio---------------	0-11	70-90	2-15	5-12	1.50-1.70	6-20	0.07-0.12	0.0-1.9	0.2-0.8	.17	.17	5	2	134
	11-26	55-80	2-30	8-20	1.30-1.60	2-6	0.11-0.17	0.0-1.9	0.2-0.5	.24	.24			
	26-35	25-75	6-40	20-35	1.30-1.54	0.6-2	0.12-0.18	2.9-4.9	0.1-0.5	.32	.32			
	35-57	20-75	8-40	20-45	1.10-1.41	0.6-2	0.11-0.14	1.9-5.9	0.1-0.5	.32	.32			
	57-80	20-85	5-45	8-35	1.40-1.70	0.6-6	0.07-0.14	0.0-3.9	0.1-0.3	.28	.28			
W:														
Water---------------	---	---	---	---	---	---	---	---	---	---	---	--	---	---
YeA:														
Yellowlake----------	0-14	5-20	40-60	28-40	1.00-1.10	0.06-0.6	0.10-0.18	9.0-15.0	2.0-4.0	.32	.32	5	4L	86
	14-22	1-20	25-55	40-70	1.00-1.30	0.00-0.06	0.10-0.16	9.0-20.0	0.8-1.5	.32	.32			
	22-45	1-15	25-55	30-70	1.00-1.30	0.00-0.06	0.08-0.14	9.0-20.0	0.3-0.7	.32	.32			
	45-66	1-20	25-55	40-70	1.00-1.30	0.00-0.06	0.05-0.11	9.0-20.0	0.3-0.7	.32	.32			
	66-80	1-20	25-55	40-70	1.00-1.30	0.00-0.06	0.03-0.10	9.0-20.0	0.1-0.7	.32	.32			
YhE:														
Yellowhouse---------	0-5	20-40	25-50	28-40	1.30-1.50	0.2-2	0.09-0.17	2.5-6.0	1.0-3.0	.24	.43	2	5	56
	5-10	10-40	25-50	28-50	1.30-1.50	0.06-2	0.09-0.17	3.0-6.0	0.5-2.0	.32	.32			
	10-22	10-40	25-50	30-55	1.30-1.50	0.06-0.6	0.09-0.16	6.0-8.9	0.5-1.0	.32	.32			
	22-27	5-30	20-40	35-65	1.30-1.50	0.01-0.06	0.07-0.12	5.0-8.9	0.1-0.5	.17	.32			
	27-80	---	---	---	---	0.00-0.1	---	---	---	---	---			
ZmA:														
Zita----------------	0-18	15-65	25-45	12-28	1.30-1.60	0.6-2	0.15-0.20	0.5-3.9	1.5-3.0	.28	.28	5	6	48
	18-24	15-50	25-60	18-35	1.35-1.50	0.6-2	0.13-0.18	1.9-5.9	0.8-1.5	.32	.32			
	24-35	15-50	15-60	18-50	1.40-1.55	0.6-2	0.10-0.12	0.5-2.9	0.1-0.5	.32	.32			
	35-80	15-50	15-60	18-50	1.40-1.55	0.6-2	0.10-0.12	0.5-2.9	0.1-0.4	.32	.32			

Table 29.—Chemical Soil Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
AcA:								
Acuff----------------	0-12	11-23	---	6.6-7.8	0	0	0.0-2.0	0-1
	12-41	16-25	---	6.6-8.4	0-2	0	0.0-2.0	0-1
	41-58	8.4-11	---	7.9-9.0	40-65	0	0.0-2.0	0-1
	58-80	14-19	---	7.9-8.4	15-50	0	0.0-2.0	0-1
AcB:								
Acuff----------------	0-11	11-23	---	6.6-7.8	0	0	0.0-2.0	0-1
	11-41	16-25	---	6.6-8.4	0-2	0	0.0-2.0	0-1
	41-58	8.4-11	---	7.9-9.0	40-65	0	0.0-2.0	0-1
	58-80	14-20	---	7.9-8.4	15-50	0	0.0-2.0	0-1
AfA:								
Amarillo-------------	0-10	8.6-17	---	6.6-8.4	0	0	0.0-2.0	0-1
	10-41	16-26	---	7.4-8.4	0-3	0	0.0-2.0	0-1
	41-56	9.6-15	---	7.9-9.0	40-65	0	0.0-2.0	0-1
	56-80	12-19	---	7.9-8.4	15-50	0	0.0-2.0	0-1
AfB:								
Amarillo-------------	0-9	8.6-17	---	6.6-8.4	0	0	0.0-2.0	0-1
	9-40	16-26	---	7.4-8.4	0-3	0	0.0-2.0	0-1
	40-56	9.6-15	---	7.9-9.0	40-65	0	0.0-2.0	0-1
	56-80	12-19	---	7.9-8.4	15-50	0	0.0-2.0	0-1
AfC:								
Amarillo-------------	0-9	8.6-17	---	6.6-8.4	0	0	0.0-2.0	0-1
	9-40	16-26	---	7.4-8.4	0-3	0	0.0-2.0	0-1
	40-56	9.6-15	---	7.9-9.0	40-65	0	0.0-2.0	0-1
	56-80	12-19	---	7.9-8.4	15-50	0	0.0-2.0	0-1
ArA:								
Arch-----------------	0-6	7.9-18	---	7.4-8.4	3-20	0	0.0-2.0	0
	6-16	7.3-23	---	7.9-9.0	5-30	0	0.0-2.0	0
	16-37	7.3-19	---	7.9-9.0	40-60	0	0.0-2.0	0
	37-80	7.3-19	---	7.9-9.0	40-60	0	0.0-2.0	0
AvA:								
Arvana---------------	0-11	8.6-13	---	6.6-8.4	0-1	0	0.0-1.0	0
	11-26	12-25	---	7.9-8.4	0-3	0	0.0-1.0	0
	26-37	---	---	---	60-80	---	---	---
	37-80	4.1-15	---	7.9-9.0	40-70	0	0.0-5.0	0-5
AvB:								
Arvana---------------	0-9	8.6-13	---	6.6-8.4	0-1	0	0.0-1.0	0
	9-26	12-25	---	7.9-8.4	0-3	0	0.0-1.0	0
	26-37	---	---	---	60-80	---	---	---
	37-80	4.1-15	---	7.9-9.0	40-70	0	0.0-5.0	0-5
BcA:								
Bippus---------------	0-14	13-28	---	6.6-8.4	0-2	0	0.0-2.0	0
	14-65	16-26	---	7.9-8.4	0-5	0	0.0-2.0	0
	65-80	7.4-23	---	7.9-8.4	3-15	0	0.0-2.0	0
BeC:								
Berda----------------	0-7	10-19	---	7.4-8.4	2-10	0	0.0-1.0	0-1
	7-22	13-23	---	7.4-8.4	2-10	0	0.0-2.0	0-2
	22-52	12-20	---	7.9-9.0	5-15	0	1.0-5.0	2-8
	52-80	10-16	---	7.9-9.0	5-30	0	1.0-5.0	2-8

Table 29.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
BP:								
Borrow pits	0-20	---	---	7.9-8.4	20-80	0	0.0-2.0	0
	20-80	---	---	7.9-8.4	20-80	0	0.0-2.0	0
BpD:								
Berda	0-6	10-19	---	7.4-8.4	2-10	0	0.0-1.0	0-1
	6-20	13-23	---	7.4-8.4	2-10	0	0.0-2.0	0-2
	20-52	12-20	---	7.9-9.0	5-15	0	1.0-5.0	2-8
	52-80	10-16	---	7.9-9.0	5-30	0	1.0-5.0	2-8
Potter	0-6	16-34	---	7.4-8.4	10-40	0	0.0-2.0	0
	6-15	6.3-23	---	7.9-8.4	40-80	0	0.0-2.0	0
	15-29	5.9-18	---	7.9-9.0	40-80	0	0.0-2.0	0
	29-80	5.1-18	---	7.9-9.0	40-60	0	0.0-2.0	0
ChA:								
Chapel	0-5	30-44	---	7.4-8.4	0-10	0	0.0-2.0	0-2
	5-14	29-43	---	7.4-8.4	0-10	0	0.0-2.0	0-2
	14-35	27-36	---	7.9-8.4	5-40	0	0.0-2.0	0-2
	35-80	4.7-16	---	7.9-9.0	15-60	0	0.0-2.0	0-2
CtC:								
Creta	0-8	8.9-19	---	7.4-8.4	0-10	0	0.0-2.0	0-2
	8-27	8.0-15	---	7.9-8.4	3-14	0	0.0-4.0	0-13
	27-44	11-16	---	7.9-9.0	15-30	0	4.0-16.0	3-25
	44-70	19-30	---	7.9-9.0	5-15	5-20	4.0-16.0	5-30
	70-80	---	---	---	---	---	---	---
DRC:								
Drake	0-15	6.3-13	---	7.4-8.4	5-15	0	0.0-2.0	0-5
	15-28	9.3-18	---	7.9-9.0	10-30	0	0.0-2.0	0-5
	28-69	8.3-18	---	7.9-9.0	10-30	0	0.0-6.0	0-13
	69-80	5.2-18	---	7.9-9.0	10-30	0-4	0.0-6.0	0-13
DRE:								
Drake	0-14	6.3-13	---	7.4-8.4	5-15	0	0.0-2.0	0-5
	14-28	9.3-18	---	7.9-9.0	10-30	0	0.0-2.0	0-5
	28-69	8.3-18	---	7.9-9.0	10-30	0	0.0-6.0	0-13
	69-80	5.2-18	---	7.9-9.0	10-30	0-4	0.0-6.0	0-13
EsA:								
Estacado	0-6	11-23	---	7.4-8.4	0-2	0	0.0-2.0	0
	6-38	15-28	---	7.4-8.4	1-5	0	0.0-2.0	0
	38-50	15-27	---	7.9-8.4	15-40	0	0.0-2.0	0
	50-80	15-34	---	7.9-9.0	40-60	0	0.0-2.0	0
FrA:								
Friona	0-8	11-23	---	6.6-8.4	0	0	0	0
	8-31	15-26	---	7.4-8.4	0-10	0	0	0
	31-35	---	---	---	---	---	---	---
	35-80	12-25	---	7.9-8.4	15-50	0	0	0
KmB:								
Kimberson	0-11	10-20	---	7.4-8.4	1-20	0	0.0-2.0	0
	11-28	---	---	---	60-90	---	---	---
	28-64	3.9-5.1	---	7.9-8.4	40-80	0	0.0-4.0	0-8
	64-80	---	---	---	60-90	---	---	---

Table 29.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
LDA:								
Levelland	0-31	4.3-15	---	7.4-8.4	0-3	0	0.0-1.0	0-1
	31-45	8.1-16	---	7.4-8.4	0-3	0	0.0-1.0	0-1
	45-70	8.1-25	---	7.4-8.4	0-3	0	0.0-1.0	0-1
	70-80	4.3-11	---	7.9-8.4	3-20	0	0.0-1.0	0-1
LDF:								
Landfill	0-80	---	---	---	---	---	---	---
LeA:								
Lenorah	0-8	7.1-15	---	7.9-8.4	1-8	0	0.0-3.0	0-4
	8-22	15-25	---	7.9-9.0	2-12	0	6.0-28.0	8-31
	22-47	12-19	---	7.9-9.0	15-50	0	6.0-28.0	8-31
	47-65	3.6-12	---	7.9-9.0	5-12	0	6.0-16.0	8-31
	65-80	2.7-6.1	---	7.4-9.0	2-10	0	2.0-16.0	1-20
LoA:								
Lofton	0-9	24-32	---	6.6-8.4	0	0	0.0-3.0	0
	9-38	31-37	---	7.4-8.4	0-5	0	0.0-3.0	0
	38-52	21-32	---	7.9-8.4	5-15	0	0.0-3.0	0
	52-80	18-23	---	7.9-8.4	15-40	0	0.0-3.0	0
M-W:								
Miscellaneous water	---	---	---	---	---	---	---	---
MdA:								
Midessa	0-10	8.4-14	---	7.9-8.4	2-8	0	0.0-2.0	0
	10-30	13-18	---	7.9-8.4	5-20	0	0.0-2.0	0-1
	30-60	6.5-18	---	7.9-9.0	40-65	0	0.0-2.0	0-2
	60-80	7.9-16	---	7.9-9.0	15-50	0	0.0-2.0	0-2
MdB:								
Midessa	0-9	8.4-14	---	7.9-8.4	2-8	0	0.0-2.0	0
	9-30	13-18	---	7.9-8.4	5-20	0	0.0-2.0	0-1
	30-60	6.5-18	---	7.9-9.0	40-65	0	0.0-2.0	0-2
	60-80	7.9-16	---	7.9-9.0	15-50	0	0.0-2.0	0-2
MPC:								
Midessa	0-7	8.4-14	---	7.9-8.4	2-8	0	0.0-2.0	0
	7-29	13-18	---	7.9-8.4	5-20	0	0.0-2.0	0-1
	29-60	6.5-18	---	7.9-9.0	40-65	0	0.0-2.0	0-2
	60-80	7.9-16	---	7.9-9.0	15-50	0	0.0-2.0	0-2
Posey	0-8	7.1-14	---	7.9-8.4	2-12	0	0.0-2.0	0
	8-15	12-18	---	7.9-8.4	10-25	0	0.0-2.0	0
	15-37	8.1-20	---	7.9-9.0	30-70	0	0.0-2.0	0
	37-80	12-18	---	7.9-8.4	15-40	0	0.0-2.0	0
NtC:								
Nutivoli	0-6	2.3-5.4	---	6.6-7.8	0	0	0.0-2.0	0
	6-40	2.3-7.4	---	6.6-7.8	0-3	0	0.0-2.0	0
	40-80	2.3-7.4	---	6.6-7.8	0-3	0	0.0-2.0	0
OcA:								
Olton	0-8	22-31	---	6.6-8.4	0	0	0.0-1.0	0
	8-31	21-38	---	7.4-8.4	0-5	0	0.0-1.0	0-1
	31-48	20-26	---	7.9-8.4	2-15	0	0.0-1.0	0-1
	48-80	8.5-18	---	7.9-8.4	15-60	0	0.0-1.0	0-1

Table 29.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
PAB:								
Patricia	0-12	2.7-10	---	6.6-8.4	0	0	0.0-1.0	0
	12-40	9.2-21	---	6.6-8.4	0	0	0.0-1.0	0
	40-78	14-24	---	6.6-8.4	0-1	0	0.0-1.0	0
	78-80	3.5-12	---	7.9-9.0	15-70	0	0.0-1.0	0
Amarillo	0-16	3.8-10	---	6.6-8.4	0	0	0.0-2.0	0
	16-53	14-23	---	7.4-8.4	0-2	0	0.0-2.0	0-1
	53-68	8.1-15	---	7.9-9.0	40-60	0	0.0-2.0	0-1
	68-80	12-18	---	7.9-8.4	15-30	0	0.0-2.0	0-1
PeA:								
Pep	0-10	12-18	---	7.4-8.4	3-8	0	0.0-2.0	0
	10-16	12-21	---	7.4-8.4	5-10	0	0.0-2.0	0
	16-32	11-18	---	7.9-8.4	10-40	0	0.0-2.0	0
	32-80	7.9-16	---	7.9-9.0	40-60	0	0.0-2.0	0
PeB:								
Pep	0-9	12-18	---	7.4-8.4	3-8	0	0.0-2.0	0
	9-15	12-21	---	7.4-8.4	5-10	0	0.0-2.0	0
	15-30	11-18	---	7.9-8.4	10-40	0	0.0-2.0	0
	30-80	7.9-16	---	7.9-9.0	40-60	0	0.0-2.0	0
PGE:								
Potter	0-6	16-34	---	7.4-8.4	10-40	0	0.0-2.0	0
	6-15	6.3-23	---	7.9-8.4	40-80	0	0.0-2.0	0
	15-29	5.9-18	---	7.9-9.0	40-80	0	0.0-2.0	0
	29-80	5.1-18	---	7.9-9.0	40-60	0	0.0-2.0	0
PoA:								
Portales	0-15	12-17	---	7.9-8.4	2-8	0	0.0-1.0	0-1
	15-35	14-23	---	7.4-8.4	5-25	0	0.0-1.0	0-1
	35-43	12-16	---	7.4-8.4	15-50	0	0.0-3.0	0-2
	43-80	4.5-11	---	7.4-9.0	40-75	0	0.0-3.0	0-2
PoB:								
Portales	0-14	12-17	---	7.9-8.4	2-8	0	0.0-1.0	0-1
	14-35	14-23	---	7.4-8.4	5-25	0	0.0-1.0	0-1
	35-43	12-16	---	7.4-8.4	15-50	0	0.0-3.0	0-2
	43-80	4.5-11	---	7.4-9.0	40-75	0	0.0-3.0	0-2
PsA:								
Posey	0-11	7.1-14	---	7.9-8.4	2-12	0	0.0-2.0	0
	11-19	12-18	---	7.9-8.4	10-25	0	0.0-2.0	0
	19-39	8.1-20	---	7.9-9.0	30-70	0	0.0-2.0	0
	39-80	12-18	---	7.9-8.4	15-40	0	0.0-2.0	0
PsB:								
Posey	0-10	7.1-14	---	7.9-8.4	2-12	0	0.0-2.0	0
	10-18	12-18	---	7.9-8.4	10-25	0	0.0-2.0	0
	18-39	8.1-20	---	7.9-9.0	30-70	0	0.0-2.0	0
	39-80	12-18	---	7.9-8.4	15-40	0	0.0-2.0	0
PsC:								
Posey	0-8	7.1-14	---	7.9-8.4	2-12	0	0.0-2.0	0
	8-15	12-18	---	7.9-8.4	10-25	0	0.0-2.0	0
	15-37	8.1-20	---	7.9-9.0	30-70	0	0.0-2.0	0
	37-80	12-18	---	7.9-8.4	15-40	0	0.0-2.0	0

Table 29.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
RcA:								
Ranco	0-9	30-43	---	7.4-8.4	0-5	0	0.0-2.0	0
	9-25	29-33	---	7.4-8.4	0-14	0	0.0-2.0	0
	25-61	28-31	---	7.9-8.4	1-14	0	0.0-2.0	0
	61-80	28-33	---	7.9-8.4	1-14	0	0.0-2.0	0
SgA:								
Seagraves	0-25	6.9-17	---	6.6-7.8	0	0	0.0-2.0	0
	25-39	4.3-16	---	6.6-7.8	0	0	0.0-2.0	0
	39-57	15-34	---	6.6-7.8	0-3	0	0.0-2.0	0-3
	57-80	16-32	---	7.4-9.0	10-30	0	0.0-2.0	0-3
ShB:								
Sharvana	0-6	5.5-17	---	6.6-8.4	0-3	0	0.0-1.0	0
	6-16	15-26	---	6.6-8.4	0-3	0	0.0-1.0	0
	16-36	---	---	---	60-90	0	0	0
	36-80	1.0-6.8	---	7.9-9.0	40-80	0	0.0-2.0	0-5
SL:								
Water, intermittent, salt lake	0-80	---	---	---	---	---	8.0-32.0	13-50
SpA:								
Sparenberg	0-4	30-41	---	5.6-8.4	0-2	0	0	0
	4-10	26-40	---	7.4-8.4	0-2	0	0	0
	10-61	28-40	---	6.6-8.4	0-5	0	0	0
	61-80	28-38	---	6.6-8.4	0-10	0	0	0
TkA:								
Tokio	0-9	5.4-11	---	7.4-8.4	0	0	0	0
	9-22	2.7-18	---	7.4-8.4	0-1	0	0	0
	22-34	10-18	---	7.4-8.4	0-1	0	0	0
	34-57	9.9-18	---	7.9-9.0	15-50	0	0.0-2.0	0-2
	57-80	4.2-11	---	7.9-9.0	10-60	0	0.0-2.0	0-2
TkB:								
Tokio	0-11	2.7-5.9	---	7.4-8.4	0	0	0	0
	11-26	2.7-18	---	7.4-8.4	0-1	0	0	0
	26-35	10-18	---	7.4-8.4	0-1	0	0	0
	35-57	9.9-18	---	7.9-9.0	15-50	0	0.0-2.0	0-2
	57-80	4.2-11	---	7.9-9.0	10-60	0	0.0-2.0	0-2
W:								
Water	---	---	---	---	---	---	---	---
YeA:								
Yellowlake	0-14	7.4-30	---	7.4-8.4	3-30	0	0.0-16.0	2-40
	14-22	8.9-24	---	7.9-9.0	30-50	0-3	4.0-25.0	13-40
	22-45	5.2-25	---	7.9-9.0	35-50	1-15	4.0-25.0	13-50
	45-66	8.6-26	---	7.9-11.0	35-50	1-10	15.0-30.0	30-75
	66-80	8.6-25	---	7.9-11.0	35-50	0-5	15.0-30.0	30-75
YhE:								
Yellowhouse	0-5	15-21	---	7.9-9.0	20-55	0	0.0-1.0	0
	5-10	14-22	---	7.9-9.0	20-60	0	0.0-2.0	0-5
	10-22	15-25	---	7.9-9.0	10-40	0-2	0.0-2.0	0-5
	22-27	20-31	---	7.9-9.0	5-20	0-3	0.0-8.0	0-13
	27-80	---	---	---	---	---	---	---

Table 29.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	Inches	meq/100 g	meq/100 g	pH	Pct	Pct	mmhos/cm	
ZmA:								
Zita-----------------	0-18	11-23	---	7.4-8.4	0	0	0	0
	18-24	15-27	---	7.9-8.4	0-5	0	0	0
	24-35	9.6-23	---	7.9-8.4	30-60	0	0.0-2.0	0
	35-80	9.6-23	---	7.9-8.4	30-60	0	0.0-2.0	0

Table 30.—Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
AcA:										
Acuff	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
AcB:										
Acuff	B	Low	Jan-Dec	---	---	---	---	None	---	None
AfA:										
Amarillo	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
AfB:										
Amarillo	B	Low	Jan-Dec	---	---	---	---	None	---	None
AfC:										
Amarillo	B	Low	Jan-Dec	---	---	---	---	None	---	None
ArA:										
Arch	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
AvA:										
Arvana	C	Low	Jan-Dec	---	---	---	---	None	---	None
AvB:										
Arvana	C	Medium	Jan-Dec	---	---	---	---	None	---	None
BcA:										
Bippus	B	Negligible	Apr-Oct	---	---	---	---	None	Very brief	Occasional
BeC:										
Berda	B	Low	Jan-Dec	---	---	---	---	None	---	None
BP:										
Borrow pits	D	Negligible	Jan-Mar	---	---	---	---	---	---	None
			April	---	---	0.0-0.5	Long	Occasional	---	None
			May-Sept	---	---	0.0-2.0	Long	Occasional	---	None
			Oct	---	---	0.0-0.5	Long	Occasional	---	None
			Nov-Dec	---	---	---	---	---	---	None

Table 30.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
BpD:										
Berda	B	Medium	Jan-Dec	---	---	---	---	None	---	None
Potter	C	High	Jan-Dec	---	---	---	---	None	---	None
ChA:										
Chapel	D	Negligible	Jan-Mar	---	---	---	---	---	---	None
			April	---	---	0.0-0.6	Brief	Occasional	---	None
			May-Sept	---	---	0.0-1.0	Brief	Occasional	---	None
			Oct	---	---	0.0-0.6	Brief	Occasional	---	None
			Nov-Dec	---	---	---	---	---	---	None
CtC:										
Creta	B	Low	Jan-Dec	---	---	---	---	None	---	None
DRC:										
Drake	B	Medium	Jan-Dec	---	---	---	---	None	---	None
DRE:										
Drake	B	Medium	Jan-Dec	---	---	---	---	None	---	None
EsA:										
Estacado	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
FrA:										
Friona	C	Medium	Jan-Dec	---	---	---	---	None	---	None
KmB:										
Kimberson	D	High	Jan-Dec	---	---	---	---	None	---	None
LDA:										
Levelland	B	Negligible	Apr-Oct	---	---	---	---	---	Very brief	Occasional
LDF:										
Landfill	D	Very low	Jan-Dec	---	---	---	---	---	---	None
LeA:										
Lenorah	C	Negligible	Apr	3.0-6.7	>6.0	---	---	---	Very brief	Very rare
			May-Jun	2.0-5.0	>6.0	---	---	---	Very brief	Very rare
			Sept-Oct	3.0-6.7	>6.0	---	---	---	Very brief	Very rare

Table 30.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
LoA:										
Lofton	D	Negligible	Jan-Apr	---	---	---	---	---	---	None
			May-Sept	---	---	0.2-1.0	Very brief	Occasional	---	None
			Oct-Dec	---	---	---	---	---	---	None
M-W:										
Miscellaneous water	---	---	Jan-Dec	---	---	---	---	None	---	---
MdA:										
Midessa	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
MdB:										
Midessa	B	Low	Jan-Dec	---	---	---	---	None	---	None
MPC:										
Midessa	B	Medium	Jan-Dec	---	---	---	---	None	---	None
Posey	B	Medium	Jan-Dec	---	---	---	---	None	---	None
NtC:										
Nutivoli	A	Low	Jan-Dec	---	---	---	---	None	---	None
OcA:										
Olton	C	Low	Jan-Dec	---	---	---	---	None	---	None
PAB:										
Patricia	B	Low	Jan-Dec	---	---	---	---	None	---	None
Amarillo	B	Low	Jan-Dec	---	---	---	---	None	---	None
PeA:										
Pep	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
PeB:										
Pep	B	Low	Jan-Dec	---	---	---	---	None	---	None
PGE:										
Potter	C	High	Jan-Dec	---	---	---	---	None	---	None

Table 30.—Water Features—Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
PoA:										
Portales	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
PoB:										
Portales	B	Low	Jan-Dec	---	---	---	---	None	---	None
PsA:										
Posey	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
PsB:										
Posey	B	Low	Jan-Dec	---	---	---	---	None	---	None
PsC:										
Posey	B	Medium	Jan-Dec	---	---	---	---	None	---	None
RcA:										
Ranco	D	Negligible	Jan-Mar	---	---	---	---	---	---	None
			Apr	1.0-1.5	2.0-3.0	0.0-3.0	Long	Frequent	---	None
			May-Jun	0.0-0.5	2.0-3.0	0.0-3.0	Long	Frequent	---	None
			Jul-Aug	---	---	0.0-3.0	Long	Frequent	---	None
			Sept-Oct	0.0-0.5	2.0-3.0	0.0-3.0	Long	Frequent	---	None
			Nov	1.0-1.5	2.0-3.0	---	---	---	---	None
			Dec	---	---	---	---	---	---	None
SgA:										
Seagraves	B	Negligible	Jan-Apr	---	---	---	---	---	---	None
			May-Jun	---	---	0.2-1.0	Very brief	Occasional	---	None
			June	---	---	0.2-1.0	Very brief	Occasional	---	None
			Jul-Aug	---	---	---	---	---	---	None
			August	---	---	---	---	---	---	None
			Sept-Oct	---	---	0.2-1.0	Very brief	Occasional	---	None
			Nov-Dec	---	---	---	---	---	---	None
ShB:										
Sharvana	C	High	Jan-Dec	---	---	---	---	None	---	None

Table 30.—Water Features—Continued

Map symbol and soil name	Hydro-logic group	Surface runoff	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
				Ft	Ft	Ft				
SL:										
Water, intermittent, salt lake	D	Negligible	Jan-Feb	0.1-0.5	>6.0	---	---	---	---	---
			Mar	0.0	>6.0	---	---	---	---	---
			Apr-Jun	0.0	>6.0	0.5-4.0	Very long	Frequent	---	---
			Jul-Aug	0.1-0.5	>6.0	0.5-4.0	Very long	Frequent	---	---
			Sept-Nov	0.0	>6.0	0.5-4.0	Very long	Frequent	---	---
			Dec	0.1-0.5	>6.0	---	---	---	---	---
SpA:										
Sparenberg	D	Negligible	Jan-Mar	---	---	---	---	---	---	None
			Apr	---	---	0.0-0.6	Brief	Occasional	---	None
			May-Sep	---	---	0.0-1.0	Brief	Occasional	---	None
			Oct	---	---	0.0-0.6	Brief	Occasional	---	None
			Nov-Dec	---	---	---	---	---	---	None
TkA:										
Tokio	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
TkB:										
Tokio	B	Negligible	Jan-Dec	---	---	---	---	None	---	None
W:										
Water	---	---	Jan-Dec	1.0-6.0	>6.0	6.1-6.1	Very long	Frequent	---	None
YeA:										
Yellowlake	D	Negligible	Jan-Mar	---	---	---	---	None	---	None
			Apr-Jun	4.9-6.7	>6.0	---	---	None	---	None
			Jul-Aug	---	---	---	---	None	---	None
			Sept-Oct	4.9-6.7	>6.0	---	---	None	---	None
			Nov-Dec	---	---	---	---	None	---	None
YhE:										
Yellowhouse	D	Very high	Jan-Dec	---	---	---	---	None	---	None
ZmA:										
Zita	B	Negligible	Jan-Dec	---	---	---	---	None	---	None

Table 31.–Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	In		In	In			
AcA:									
Acuff	---	---	---	---	0	---	None	Low	Low
AcB:									
Acuff	---	---	---	---	0	---	None	Low	Low
AfA:									
Amarillo	---	---	---	---	0	---	None	Low	Low
AfB:									
Amarillo	---	---	---	---	0	---	None	Low	Low
AfC:									
Amarillo	---	---	---	---	0	---	None	Low	Low
ArA:									
Arch	---	---	---	---	0	---	None	Moderate	Low
AvA:									
Arvana	Petrocalcic	20-40	4-30	Indurated	0	---	None	Low	Low
AvB:									
Arvana	Petrocalcic	20-40	4-30	Indurated	0	---	None	Low	Low
BcA:									
Bippus	---	---	---	---	0	---	None	Moderate	Low
BeC:									
Berda	---	---	---	---	0	---	None	Low	Low
BP:									
Borrow pits	---	---	---	---	0	---	None	Low	Low
BpD:									
Berda	---	---	---	---	0	---	None	Low	Low
Potter	---	---	---	---	0	---	None	Low	Low

Table 31.—Soil Features—Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In		In	In			
ChA:									
Chapel	---	---	---	---	0	---	None	Moderate	Low
CtC:									
Creta	Natric	---	---	Noncemented	0	---	None	High	Moderate
	Paralithic bedrock	---	---	Strongly cemented					
DRC:									
Drake	---	---	---	---	0	---	None	Low	Low
DRE:									
Drake	---	---	---	---	0	---	Low	Low	Low
EsA:									
Estacado	---	---	---	---	0	---	None	Low	Low
FrA:									
Friona	Petrocalcic	20-35	2-24	Indurated	0	---	None	Low	Low
KmB:									
Kimberson	Petrocalcic	4-20	8-60	Indurated	---	---	None	Low	Low
LDA:									
Levelland	---	---	---	---	0	---	None	Low	Low
LDF:									
Landfill	---	---	---	---	0	---	None	Moderate	---
LeA:									
Lenorah	Natric	---	---	Noncemented	0	---	None	High	Moderate
LoA:									
Lofton	---	---	---	---	---	---	None	Moderate	Low
M-W:									
Miscellaneous water	---	---	---	---	---	---	---	---	---
MdA:									
Midessa	---	---	---	---	---	---	None	Low	Low

Table 31.—Soil Features—Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	In		In	In			
MdB:									
Midessa	---	---	---	---	---	---	None	Low	Low
MPC:									
Midessa	---	---	---	---	---	---	None	Low	Low
Posey	---	---	---	---	0	---	None	Low	Low
NtC:									
Nutivoli	---	---	---	---	---	---	None	Moderate	Low
OcA:									
Olton	---	---	---	---	0	---	None	Moderate	Low
PAB:									
Patricia	---	---	---	---	---	---	None	Low	Low
Amarillo	---	---	---	---	0	---	None	Low	Low
PeA:									
Pep	---	---	---	---	0	---	None	Low	Low
PeB:									
Pep	---	---	---	---	0	---	None	Low	Low
PGE:									
Potter	---	---	---	---	0	---	None	Low	Low
PoA:									
Portales	---	---	---	---	0	---	None	Low	Low
PoB:									
Portales	---	---	---	---	0	---	None	Low	Low
PsA:									
Posey	---	---	---	---	0	---	None	Low	Low
PsB:									
Posey	---	---	---	---	0	---	None	Low	Low
PsC:									
Posey	---	---	---	---	0	---	None	Low	Low

Table 31.–Soil Features–Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In		In	In			
RcA:									
Ranco	---	---	---	---	0	---	None	High	Low
SgA:									
Seagraves	---	---	---	---	0	---	None	Low	Low
ShB:									
Sharvana	Petrocalcic	8-22	2-18	Indurated	0	---	None	Low	Low
SL:									
Water, intermittent, salt lake	---	---	---	---	---	---	---	High	High
SpA:									
Sparenberg	---	---	---	---	0	---	None	Moderate	Low
TkA:									
Tokio	---	---	---	---	0	---	None	Low	Low
TkB:									
Tokio	---	---	---	---	0	---	None	Low	Low
W:									
Water	---	---	---	---	0	---	---	---	---
YeA:									
Yellowlake	Salic	---	---	---	---	---	None	High	High
	Natric	---	---	---					
YhE:									
Yellowhouse	Paralithic bedrock	---	---	Weakly cemented	0	---	None	Moderate	Moderate
ZmA:									
Zita	---	---	---	---	---	---	None	Low	Low

Table 32.—Physical Analyses of Selected Soils

			Particle Size distribution (percent less than 2 mm)										
			Sand										
Soil Name and Sample number	Depth	Horizon	Very Coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very Fine (0.1-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk Density 1/3 bar	Water Content 1/3 bar
	Inches										cm/cm	g/cc	Pct. (wt)
Amarillo 1,2													
(S04TX079-001)	0 to 10	A	tr	0.1	5.0	35.6	25.7	66.4	19.0	14.6	0.020	1.50	17.4
	10 to 19	Bw	tr	0.2	6.1	40.2	24.5	71.0	13.9	15.1	0.023	1.39	15.4
	19 to 30	Bt	tr	0.3	7.9	36.5	22.3	67.0	14.4	18.6	0.023	1.39	16.6
	30 to 48	Btk	tr	0.3	6.9	38.4	18.4	64.0	13.2	22.8	0.032	1.40	20.6
	48 to 62	Bkk1	3.1	4.6	7.0	21.1	10.9	46.7	27.7	25.6	0.005	1.52	20.2
	62 to 80	Bkk2	0.3	0.6	5.2	20.6	9.9	36.6	35.5	27.9	0.016	1.49	19.5
Arvana 1,3													
(S04TX219-002)	0 to 5	Ap1	tr	1.0	5.1	38.8	22.3	67.2	17.9	14.9	0.016	1.48	11.2
	5 to 11	Ap2	tr	1.0	4.8	33.5	25.9	65.2	18.1	16.7	0.021	1.57	11.9
	11 to 16	Bt1	0.1	1.2	4.8	32.2	19.7	58.0	16.6	25.4	0.032	1.53	16.9
	16 to 26	Bt2	0.1	1.8	5.0	29.9	22.2	59.0	15.7	25.3	0.034	1.52	16.2
	26 to 30	Bkkm1	20.7	17.2	13.6	14.3	7.4	73.2	17.4	9.4			
	30 to 37	Bkkm2	7.5	9.8	13.6	26.6	16.8	74.3	14.1	11.6			
	37 to 48	Bkk1	3.5	4.9	7.6	22.0	13.6	51.6	24.1	24.3	0.007	1.45	17.3
	48 to 65	Bkk2	0.4	4.0	5.9	19.3	13.3	42.9	30.4	26.7	0.008	1.49	16.3
	65 to 74	Bk1	1.1	2.6	6.4	24.9	13.1	48.1	29.1	22.8			
	74 to 80	Bk2	0.4	1.8	6.8	25.0	17.3	51.3	25.3	23.4			
Creta 1													
(S96TX219-002)	0 to 4	A1	0.7	1.0	3.4	22.5	27.2	54.8	30.7	14.5			
	4 to 8	A2	1.1	1.4	4.3	23.4	25.3	55.5	23.9	20.6	0.024	1.37	21.3
	8 to 16	Bw	2.0	2.0	4.1	21.9	22.1	52.1	25.4	22.5	0.025	1.35	22.0
	16 to 27	Bt	0.7	1.0	3.5	21.3	22.3	48.8	26.6	24.6	0.042	1.44	23.4
	27 to 34	Btkn1	1.6	1.4	3.6	20.1	20.9	47.6	26.1	26.3	0.046	1.54	21.7
	34 to 44	Btkn2	1.3	1.2	2.9	16.9	18.1	40.4	27.5	32.1	0.055	1.48	25.0
	44 to 57	2Btn	tr	0.5	1.4	8.8	11.8	22.5	29.6	47.9	0.124	1.28	36.8
	57 to 70	2Btny	0	0.2	0.5	3.2	4.7	8.6	30.9	60.5	0.105	1.25	35.7
	70 to 80	2Cr	0.4	0.6	0.9	2.9	4.0	8.8	40.6	50.6			

Table 32.—Physical Analyses of Selected Soils—Continued

Soil Name and Sample number	Depth	Horizon	Particle Size distribution (percent less than 2 mm) Sand: Very Coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very Fine (0.1-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk Density 1/3 bar	Water Content 1/3 bar
	Inches										cm/cm	g/cc	Pct. (wt)
Kimberson 1													
(S99TX219-001)	0 to 5	A1	0.6	0.7	1.8	14.1	27.0	44.2	37.2	18.6	0.014	1.40	18.4
	5 to 11	A2	0.8	1.2	2.7	16.5	23.5	44.7	30.7	24.6			
	11 to 28	Bkkm	19.6	18.5	14.4	13.3	9.3	75.1	18.4	6.5			
	28 to 64	Bkk	9.1	7.8	10.4	24.4	20.3	72.0	18.0	10.0			
	64 to 80	B'kkm	23.9	21.3	14.6	14.1	7.2	81.1	14.4	4.5			
Patricia 1,4													
(S95TX445-047)	0 to 5	A1	tr	0.2	18.8	57.7	10.8	87.5	4.4	8.1	0.011	1.48	6.0
	5 to 12	A2	tr	0.2	18.4	59.9	9.5	88.0	2.9	9.1	0.010	1.66	8.4
	12 to 27	Bt1	0	0.1	9.3	46.6	14.3	70.3	6.5	23.2	0.029	1.57	17.1
	27 to 40	Bt2	tr	tr	8.9	45.5	15.8	70.2	7.0	22.8	0.027	1.56	16.5
	40 to 78	Bt3	tr	0.1	9.6	42.6	12.5	64.8	8.9	26.3			
	78 to 87	Btkk1	0.2	0.4	5.1	22.8	8.1	36.6	29.5	33.9			
	87 to 102	Btkk2	1.4	2.7	6.8	22.1	9.5	42.5	32.6	24.9			
Portales 1,5													
(S95TX305-002)	0 to 12	A	0.1	0.3	3.1	19.3	23.2	46.0	27.2	26.8			
	12 to 18	Bw	tr	0.1	2.5	17.2	22.3	42.1	26.5	31.4			
	18 to 24	Bk1	tr	0.1	1.7	13.9	21.0	36.7	28.7	34.6			
	24 to 41	Bk2	0.1	0.2	2.3	14.7	22.3	39.6	26.2	34.2			
	41 to 86	Bk3	0.1	0.4	2.7	15.4	16.0	34.6	25.6	39.8			
Yellowhouse 1													
(S96TX219-001)	0 to 5	A	1.5	2.0	3.0	7.7	10.2	24.4	42.5	33.1	0.036	1.42	26.2
	5 to 10	Bw1	1.5	2.1	3.0	8.1	9.4	24.1	41.2	34.7	0.059	1.32	26
	10 to 17	Bw2	0.9	1.2	2.0	5.4	7.6	17.1	32.8	50.1	0.074	1.38	28.5
	17 to 22	Bw3	0.6	1.6	2.9	6.4	13.1	24.6	29.6	45.8	0.050	1.49	25.1
	22 to 27	BC	0.2	0.5	0.8	2.2	5.0	8.7	34.6	56.7	0.067	1.39	30.5
	27 to 37	Cr1	0.1	0.2	0.3	0.5	1.4	2.5	40.2	57.3			
	37 to 70	Cr2	0.1	0.3	0.2	0.5	1.8	2.9	38.6	58.5			
	70 to 80	Cr3	tr	0.1	tr	0.2	0.7	1.0	34.8	64.2	0.084	1.42	30.2

Table 32.—Physical Analyses of Selected Soils—Continued

			Particle Size distribution (percent less than 2 mm)										
			Sand										
Soil Name and Sample number	Depth	Horizon	Very Coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very Fine (0.1-0.05 mm)	Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk Density 1/3 bar	Water Content 1/3 bar
	Inches										cm/cm	g/cc	Pct. (wt)
Yellowlake 1,6													
(S96TX279-001)	0 to 7	A	tr	0.1	0.3	3.9	14.8	19.1	47.4	33.5	0.101	1.04	45.6
	7 to 14	An	tr	0.1	0.3	2.2	8.1	10.7	31.9	57.4	0.092	1.06	43.5
	14 to 22	Btn	tr	tr	0.1	0.4	1.6	2.1	32.7	65.2	0.143	1.18	42.5
	22 to 33	Btny1	tr	0.3	0.6	1.2	1.3	3.4	63.7	32.9	0.114	1.15	42.3
	33 to 45	Btny2	0.1	0.1	0.1	0.3	0.5	1.1	26.6	72.3	0.189	1.04	51.4
	45 to 66	BCny	0	0	0.1	0.5	0.5	1.1	30.7	68.2	0.160	1.13	49.0
	66 to 80	C	0	0	tr	0.2	0.5	0.7	32.0	67.3	0.138	1.14	48.3

1 Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

2 Pedon is located in Cochran County, Texas; from the intersection of Highway 214 and Highway 125 in Lehman; 3 miles east on Highway 125; about 0.3 mile north on private road; and about 450 feet north in pasture. Whiteface NW, Texas USGS quad; Latitude: 33 degrees, 37 minutes, 35.5 seconds N.; Longitude: 102 degrees, 44 minutes, 43.3 seconds W., NAD 1983.

3 Pedon is located in Hockley County, Texas; from the intersection of Highway 303 and Highway 597 which is about 3 miles south of Pep; 1 mile south on Highway 303; 2 miles west on Highway 597; 0.2 miles south on county road; 220 feet east in pasture. Pep, Texas USGS quad; Latitude: 33 degrees, 46 minutes, 7.8 seconds N.; Longitude: 102 degrees, 35 minutes, 45 seconds W., NAD 1983.

4 Pedon is located in Terry County, Texas; from the intersection of Texas Highway 137 and Farm Road 1076, approximately 6 miles southeast of Brownfield, 2 miles east on Farm Road 1076 to Union School, 3.2 miles north on unpaved county road, then 200 feet west in cultivated field; Latitude: 33 degrees, 07 minutes, 26.13 seconds N; Longitude: 102 degrees, 12 minutes, 21.77 seconds W; Union School, Texas USGS quad; NAD 27.

5 Pedon is located in Lynn County, Texas; from the intersection of U.S. Highway 380 and U.S. Highway 87 in Tahoka, Texas; approximately 4.8 miles west on U.S. Highway 380, 2.7 miles south on county road, 1.6 miles east in rangeland. Latitude: 33 degrees, 07 minutes, 46.0 seconds N; Longitude: 101 degrees, 50 minutes, 55.0 seconds W; Tahoka, Texas USGS quad; NAD 83.

6 Pedon is located in Lamb County, Texas; from the intersection of Farm Road 1490 and Farm Road 597; 3.25 miles west on Farm Road 597; north on Yellowhouse Ranch road 2.5 miles to Ranch Headquarters; from Main House north approximately 1 mile, then 1,000 feet east in rangeland; Oklahoma Flat, Texas USGS quad; Latitude: 33 degrees, 49 minutes, 47.44 seconds N; Longitude: 102 degrees, 28 minutes, 39.88 seconds W., NAD 1983.

Table 33.—Chemical Analyses of Selected Soils

Soil Name and Sample number	Depth	Horizon	Extractable Bases					CEC7	Electrical Conductivity	Base Saturation	Organic Carbon 3	pH (1:1 H2O)	CaCO3	SAR
			Ca	Mg	Na	K	Sum							
	Inches		Meq/100 g						dS/m	Percent	Percent		Percent	Percent
Amarillo: 1,2,4														
(S04TX079-001)	0 to 10	A	10.7	1.1	0	0.8	12.6	11.8	0.40	100	0.92	7.6	0	0
	10 to 19	Bw	39.5	0.9	0	0.4	40.8	10.2	0	100	0.54	8.0	2.0	0
	19 to 30	Bt	44.3	0.8	0	0.4	45.5	9.4	0	100	0.48	8.1	5.0	0
	30 to 48	Btk	47.8	1.2	0	0.5	49.5	10.6	0	100	0.18	8.1	9.0	0
	48 to 62	Bkk1	42.8	1.0	0	0.2	44.0	4.7	0	100	0.05	8.2	56.0	0
	62 to 80	Bkk2	41.8	1.9	0	0.2	43.9	5.9	0	100	0.02	8.1	53.0	0
Arvana: 2,5														
(S04TX219-002)	0 to 5	Ap1	7.9	3.0	0	1.2	12.1	10.1	0.50	100	0.48	8.0	tr	0
	5 to 11	Ap2	9.3	3.6	0	0.6	13.5	11.0	0	100	0.41	8.2	tr	0
	11 to 16	Bt1	12.4	5.6	0	0.5	18.5	16.2	0	100	0.42	8.3	1.0	0
	16 to 26	Bt2	20.3	3.5	0	0.4	24.2	16.0	0	100	0.44	8.2	1.0	0
	26 to 30	Bkkm1	46.9	1.4	0.2	0.1	48.6	3.5	1.38	100	0.26	8.2	76.0	0
	30 to 37	Bkkm2	47.5	2.5	0.5	0.1	50.6	4.3	2.83	100	0.09	7.9	60.0	3.0
	37 to 48	Bkk1	48.5	5.5	0.7	0.5	55.2	9.5	3.37	100	0.24	8.0	57.0	5.0
	48 to 65	Bkk2	43.4	4.2	0.4	0.3	48.3	5.2	2.31	100	0.13	8.2	54.0	4.0
	65 to 74	Bk1	42.3	7.1	0.3	0.5	50.2	8.0	2.05	100	0.05	8.3	36.0	3.0
	74 to 80	Bk2	39.9	6.9	0.3	0.5	47.6	8.1	1.17	100	0.17	8.5	28.0	2.0
Creta: 2														
(S96TX219-002)	0 to 4	A1	37.5	1.6	0.6	1.4	41.1	13.3	0.81	100	1.12	8.3	5.0	tr
	4 to 8	A2	52.3	2.0	0.9	0.8	56.0	13.4	0	100	1.19	8.1	13.0	0
	8 to 16	Bw	39.9	3.1	0.9	0.8	44.7	13.7	0.62	100	0.71	8.4	16.0	2.0
	16 to 27	Bt	44.7	5.6	3.3	0.9	54.5	14.2	3.17	100	0.51	8.4	12.0	9.0
	27 to 34	Btkn1	47.9	7.6	5.0	0.9	61.4	14.1	6.22	100	0.33	8.3	15.0	15.0
	34 to 44	Btkn2	48.3	9.3	6.3	0.8	64.7	15.5	6.82	100	0.28	8.3	20.0	15.0
	44 to 57	2Btn	50.4	14.0	10.3	1.2	75.9	24.1	5.4	100	0.39	8.5	17.0	20.0
	57 to 70	2Btny	129.1	15.3	11.6	1.3	157.3	28.7	9.16	100	0.31	8.1	10.0	14.0
	70 to 80	2Cr	104.6	14.8	12.6	1.1	133.1	33.8	8.79	100	0.12	8.1	23.0	14.0

Table 33.—Chemical Analyses of Selected Soils—Continued

Soil Name and Sample number	Depth	Horizon	Extractable Bases Ca	Extractable Bases Mg	Extractable Bases Na	Extractable Bases K	Extractable Bases Sum	CEC7	Electrical Conductivity	Base Saturation	Organic Carbon 3	pH (1:1 H2O)	CaCO3	SAR
	Inches		Meq/100 g						dS/m	Percent	Percent		Percent	Percent
Kimberson: 1,2														
(S99TX219-001)	0 to 5	A1	13.4	3.0	tr	0.9	17.3	17.7	1.78	100	0.46	7.8	14.0	0.0
	5 to 11	A2	4.0	0.9	1.5	0.3	6.7	14.3	0.67	100	0.47	8.0	28.0	1.0
	11 to 28	Bkkm	4.0	1.3	1.9	0.4	7.6	2.3	0.72	100	0.6	8.5	81.0	1.0
	28 to 64	Bkk	4.5	9.2	14.0	0.6	28.3	4.7	2.90	100	0.2	8.4	78.0	5.0
	64 to 80	B'kkm	2.2	1.6	7.3	0.3	11.4	1.3	1.16	100	0.19	8.9	81.0	5.0
Patricia: 2,6														
(S95TX445-047)	0 to 5	A1	12.2	1.0	0	2.0	15.2	4.8	0	100	0.43	8.1	0	0
	5 to 12	A2	7.8	0.9	0.1	2.4	11.2	6.6	0	100	0.15	7.7	0	0
	12 to 27	Bt1	8.7	2.5	tr	2.1	13.3	11.7	0	100	0.26	7.2	0	0
	27 to 40	Bt2	6.0	2.5	tr	0.9	9.4	11.4	0	82	0.21	7.1	0	0
	40 to 78	Bt3	8.9	3.9	0	0.8	13.6	16.2	0	84	0.12	7.5	0	0
	78 to 87	Btkk1	50.5	2.6	0	0.9	54.0	5.8	0	100	0.15	8.8	62.0	0
	87 to 102	Btkk2	47.2	2.0	0	0	49.2	3.9	0	100	0.10	8.8	68.0	0
Portales: 2,7														
(S95TX305-002)	0 to 12	A	15.3	3.7	0.3	2.1	21.4	19.4	1.90	100	1.22	7.2	0	tr
	12 to 18	Bw	31.2	4.5	0.3	0.8	36.8	18.0	2.21	100	0.7	7.7	3.0	tr
	18 to 24	Bk1	41.9	5.1	0	1.4	48.4	14.8	0.87	100	0.4	7.1	14.0	tr
	24 to 41	Bk2	43.4	5.8	0	1.3	50.5	9.6	0	100	0.35	8.3	16.0	0
	41 to 86	Bk3	29.9	9.1	0	0.5	39.5	10.4	1.09	100	0.23	8.3	25.0	2
Yellowhouse: 2														
(S96TX219-001)	0 to 5	A	50	2.5	0.5	1.3	54.3	19.9	0.60	100	1.42	8.3	49.0	tr
	5 to 10	Bw1	47.5	3.8	0.2	0.8	52.3	17.5	0.56	100	0.7	8.4	56.0	tr
	10 to 17	Bw2	47.7	7.1	1.0	0.9	56.7	23.9	0.50	100	0.37	8.6	35.0	2.0
	17 to 22	Bw3	49	7.7	1.2	0.8	58.7	22.7	0.58	100	0.27	8.6	31.0	3.0
	22 to 27	BC	51.9	10.4	2.7	1.1	66.1	29.0	1.61	100	0.24	8.3	15.0	4.0
	27 to 37	Cr1	91.9	11.2	2.9	1.4	107.4	29.8	4.35	100	0.26	7.9	13.0	4.0
	37 to 70	Cr2	104.3	14.8	4.3	1.2	124.6	31.4	5.19	100	0.19	7.9	7.0	5.0
	70 to 80	Cr3	87.2	15.4	3.7	1.3	107.6	29.9	5.03	100	0.21	8.0	17.0	5.0

Table 33.—Chemical Analyses of Selected Soils—Continued

Soil Name and Sample number	**Depth**	**Horizon**	**Extractable Bases**					**CEC7**	**Electrical Conductivity**	**Base Saturation**	**Organic Carbon 3**	**pH (1:1 H2O)**	**CaCO3**	**SAR**
			Ca	**Mg**	**Na**	**K**	**Sum**							
	Inches		*Meq/100 g*						*dS/m*	*Percent*	*Percent*		*Percent*	*Percent*
Yellowlake: 2,8														
(S96TX279-001)	*0 to 7*	*A*	*52.9*	*5.5*	*1.6*	*3.4*	*63.4*	*28.1*	*1.12*	*100*	*2.04*	*8.3*	*4.0*	*2.0*
	7 to 14	*An*	*49.4*	*12.9*	*24.2*	*5.0*	*91.5*	*22.3*	*24.20*	*100*	*1.07*	*8.2*	*24.0*	*34.0*
	14 to 22	*Btn*	*57.6*	*20.0*	*36.5*	*4.8*	*118.9*	*21.9*	*19.01*	*100*	*0.58*	*8.7*	*41.0*	*35.0*
	22 to 33	*Btny1*	*229.4*	*23.7*	*41.6*	*3.4*	*298.1*	*20.1*	*26.00*	*100*	*0.27*	*8.8*	*35.0*	*40.0*
	33 to 45	*Btny2*	*154.0*	*23.2*	*47.7*	*4.2*	*229.1*	*22.3*	*19.96*	*100*	*0.30*	*8.9*	*36.0*	*40.0*
	45 to 66	*BCny*	*76.4*	*21.1*	*52.1*	*4.4*	*154.0*	*23.2*	*24.10*	*100*	*0.29*	*8.8*	*44.0*	*52.0*
	66 to 80	*C*	*55.7*	*19.8*	*49.7*	*4.3*	*129.5*	*22.9*	*26.80*	*100*	*0.26*	*8.9*	*47.0*	*59.0*

1 Organic carbon estimated from total carbon.

2 Extractable Ca may contain Ca from calcium carbonate or gypsum.

3 Multiply organic carbon by 1.72 to obtain percent organic matter.

4 Pedon is located in Cochran County, Texas; from the intersection of Highway 214 and Highway 125 in Lehman; 3 miles east on Highway 125; about 0.3 mile north on private road; and about 450 feet north in pasture. Whiteface NW, Texas USGS quad; Latitude: 33 degrees, 37 minutes, 35.5 seconds N.; Longitude: 102 degrees, 44 minutes, 43.3 seconds W., NAD 1983.

5 Pedon is located in Hockley County, Texas; from the intersection of Highway 303 and Highway 597 which is about 3 miles south of Pep; 1 mile south on Highway 303; 2 miles west on Highway 597; 0.2 miles south on county road; 220 feet east in pasture. Pep, Texas USGS quad; Latitude: 33 degrees, 46 minutes, 7.8 seconds N.; Longitude: 102 degrees, 35 minutes, 45 seconds W., NAD 1983.

6 Pedon is located in Terry County, Texas; from the intersection of Texas Highway 137 and Farm Road 1076, approximately 6 miles southeast of Brownfield, 2 miles east on Farm Road 1076 to Union School, 3.2 miles north on unpaved county road, then 200 feet west in cultivated field, Latitude: 33 degrees, 07 minutes, 26.13 seconds N; Longitude: 102 degrees, 12 minutes, 21.77 seconds W; Union School, Texas USGS quad; NAD 27.

7 Pedon is located in Lynn County, Texas; from the intersection of U.S. Highway 380 and U.S. Highway 87 in Tahoka, Texas; approximately 4.8 miles west on U.S. Highway 380, 2.7 miles south on county road, 1.6 miles east in rangeland. Latitude: 33 degrees, 07 minutes, 46.0 seconds N, Longitude: 101 degrees, 50 minutes, 55.0 seconds W, Tahoka, Texas, USGS quad, NAD 83.

8 Pedon is located in Lamb County, Texas: from the intersection of Farm Road 1490 and Farm Road 597; 3.25 miles west on Farm Road 597; north on Yellowhouse Ranch road 2.5 miles to Ranch Headquarters; from Main House north approximately 1 mile, then 1,000 feet east in rangeland: Oklahoma Flat, Texas, USGS quad; Latitude: 33 degrees, 49 minutes, 47.44 seconds N; Longitude: 102 degrees, 28 minutes, 39,88 seconds W., NAD 1983.

Table 34.—Clay Mineralogy of Selected Soils

Soil Name and Sample number			Percentage of clay minerals (x-ray diffraction) 2							
	Depth	Horizon	Smectite	Mica	Kaolinite	Quartz	Calcite	Smectite-Mica**	Hematite	Dolomite
	Inches									
Amarillo 1,3										
(S04TX079-001)	0 to 10	A	1	2	2	1				
	19 to 30	Bt	1	2	2	1	2			
	30 to 48	Btk		1	1	1	2			
	62 to 80	Bkk2	1	1	1	1				
Creta 1										
(S96TX219-002)	0 to 4	A1	2	2	2	1	2			
	16 to 27	Bt	3	3	2	1	3			
	27 to 34	Btkn1	2	2	2	2	3			
Patricia 1,4										
(S95TX445-047)	0 to 5	A1	2	3	2			2	1	
	12 to 27	Bt1	2	3	2			2		
	40 to 78	Bt3	3	3	2			2		
	87 to 102	Btkk2	1	1	1	1	5	1		
Portales 1,5										
(S95TX305-002)	32 to 41	Bk2	2	2	1	1	3	2		
Yellowhouse 1										
(S96TX219-001)	0 to 5	A	3	2	3	1	3			
	10 to 17	Bw2	3	2	3	2	5			
	27 to 37	Cr1	2	2	2	2	3			
Yellowlake 1,6										
(S96TX279-001)	0 to 7	A		2	1	1	2			
	14 to 22	Btn	1	1	1	1	3			1
	22 to 34	Btny1		1	1	2	3	1		2

1 Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

2 Clay minerals for soils are given as relative amounts, as follows: 1—trace; 2—small; 3—moderate; 4—abundant; 5—dominant.

3 Pedon is located in Cochran County, Texas; from the intersection of Highway 214 and Highway 125 in Lehman; 3 miles east on Highway 125; about 0.3 mile north on private road; and about 450 feet north in pasture. Whiteface NW, Texas USGS quad; Latitude: 33 degrees, 37 minutes, 35.5 seconds N.; Longitude: 102 degrees, 44 minutes, 43.3 seconds W., NAD 1983.

4 Pedon is located in Terry County, Texas; from the intersection of Texas Highway 137 and Farm Road 1076, approximately 6 miles southeast of Brownfield, 2 miles east on Farm Road 1076 to Union School, 3.2 miles north on unpaved county road, then 200 feet west in cultivated field; Latitude: 33 degrees, 07 minutes, 26.13 seconds N; Longitude: 102 degrees, 12 minutes, 21.77 seconds W; Union School, Texas USGS quad; NAD 27.

5 Pedon is located in Lynn County, Texas; from the intersection of U.S. Highway 380 and U.S. Highway 87 in Tahoka, Texas; approximately 4.8 miles west on U.S. Highway 380, 2.7 miles south on county road, 1.6 miles east in rangeland. Latitude: 33 degrees, 07 minutes, 46.0 seconds N; Longitude: 101 degrees, 50 minutes, 55.0 seconds W, Tahoka, Texas, USGS quad; NAD 83.

6 Pedon is located in Lamb County, Texas; from the intersection of Farm Road 1490 and Farm Road 597; 3.25 miles west on Farm Road 597; north on Yellowhouse Ranch Road 2.5 miles to ranch headquarters; from Main House north approximately 1 mile, then 1,000 feet east in rangeland; Oklahoma Flat, Texas, USGS quad; Latitude: 33 degrees, 49 minutes, 47.44 seconds N; Longitude: 102 degrees, 28 minutes, 39.88 seconds W., NAD 1983.

*** Interstratified smectite and mica.*

Table 35.—Taxonomic Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Acuff	Fine-loamy, mixed, superactive, thermic Aridic Paleustolls
Amarillo	Fine-loamy, mixed, superactive, thermic Aridic Paleustalfs
Arch	Fine-loamy, carbonatic, thermic Aridic Calciustepts
Arvana	Fine-loamy, mixed, superactive, thermic Petrocalcic Paleustalfs
Berda	Fine-loamy, mixed, superactive, thermic Aridic Haplustepts
Bippus	Fine-loamy, mixed, superactive, thermic Cumulic Haplustolls
Chapel	Fine, smectitic, thermic Udic Calciusterts
Creta	Fine-loamy, mixed, superactive, thermic Calcidic Argiustolls
Drake	Fine-loamy, mixed, superactive, thermic Aridic Calciustepts
Estacado	Fine-loamy, mixed, superactive, thermic Aridic Paleustolls
Friona	Fine-loamy, mixed, superactive, thermic Petrocalcic Paleustolls
Kimberson	Loamy, mixed, superactive, thermic, shallow Petrocalcic Calciustolls
Lenorah	Fine-loamy, mixed, superactive, calcareous, thermic Aeric Halaquepts
Levelland	Coarse-loamy, mixed, superactive, nonacid, thermic Aridic Ustifluvents
Lofton	Fine, mixed, superactive, thermic Vertic Argiustolls
Midessa	Fine-loamy, mixed, superactive, thermic Aridic Calciustepts
Nutivoli	Mixed, thermic Aridic Ustipsamments
Olton	Fine, mixed, superactive, thermic Aridic Paleustolls
Patricia	Fine-loamy, mixed, superactive, thermic Aridic Paleustalfs
Pep	Fine-loamy, mixed, superactive, thermic Aridic Calciustolls
Portales	Fine-loamy, mixed, superactive, thermic Aridic Calciustolls
Posey	Fine-loamy, mixed, superactive, thermic Calcidic Paleustalfs
Potter	Loamy-skeletal, carbonatic, thermic, shallow Petronodic Ustic Haplocalcids
Ranco	Fine, smectitic, thermic Ustic Epiaquerts
Seagraves	Fine-loamy, mixed, superactive, thermic Typic Haplustalfs
Sharvana	Loamy, mixed, superactive, thermic, shallow Aridic Paleustalfs
Sparenberg	Fine, smectitic, thermic Udic Haplusterts
Tokio	Fine-loamy, mixed, active, thermic Calcidic Haplustalfs
Yellowhouse	Fine, mixed, active, thermic Aridic Haplustepts
Yellowlake	Fine, mixed, semiactive, thermic Vertic Natrustolls
Zita	Fine-loamy, mixed, superactive, thermic Aridic Haplustolls

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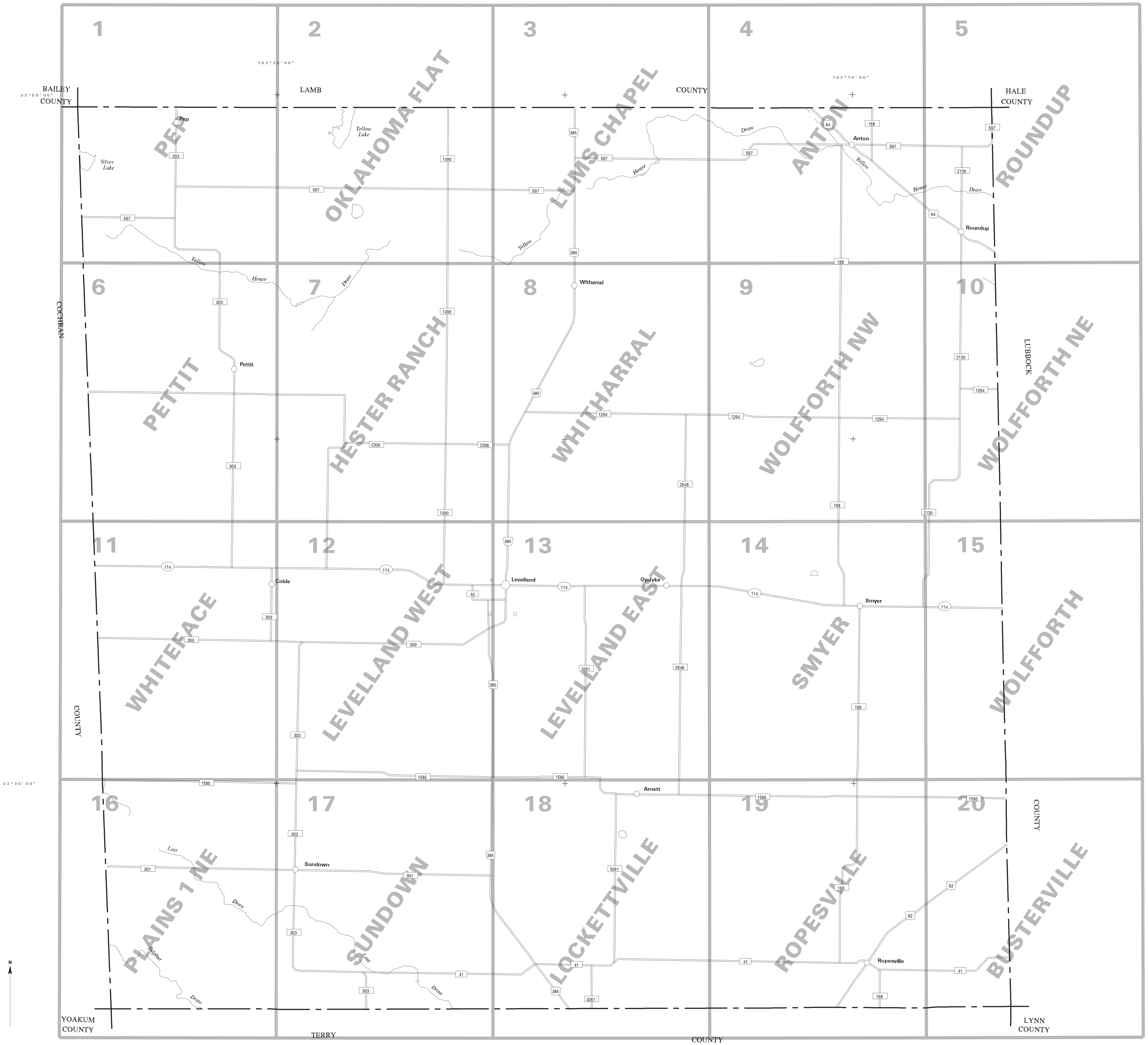

INDEX TO MAP SHEETS
HOCKLEY COUNTY, TEXAS

MILES

KILOMETERS

SCALE = 1:120000

SOIL LEGEND

Map symbols consist of a combination of letters. The first capital letter is the initial one of the soil or miscellaneous area name. The third letter, where used, indicates slope except for miscellaneous areas. Symbols with all capital letters indicate broadly defined map units or miscellaneous areas.

SYMBOL	NAME
AcA	Acuff loam, 0 to 1 percent slopes
AcB	Acuff loam, 1 to 3 percent slopes
AfA	Amarillo fine sandy loam, 0 to 1 percent slopes
AfB	Amarillo fine sandy loam, 1 to 3 percent slopes
AfC	Amarillo fine sandy loam, 3 to 5 percent slopes
ArA	Arch loam, 0 to 1 percent slopes
AvA	Arvana fine sandy loam, 0 to 1 percent slopes
AvB	Arvana fine sandy loam, 1 to 3 percent slopes
BcA	Bippus clay loam, 0 to 2 percent slopes, occasionally flooded
BeC	Berda loam, 3 to 5 percent slopes
BP	Borrow pits
BpD	Berda-Potter complex, 2 to 12 percent slopes
ChA	Chapel clay, 0 to 1 percent slopes, occasionally ponded
CtC	Creta very fine sandy loam, 1 to 5 percent slopes
DRC	Drake soils, 1 to 8 percent slopes
DRE	Drake soils, 8 to 20 percent slopes
EsA	Estacado loam, 0 to 1 percent slopes
FrA	Friona loam, 0 to 1 percent slopes
KmB	Kimberson gravelly loam, 0 to 3 percent slopes
LDA	Levelland soils, 0 to 2 percent slopes, occasionally flooded
LDF	Landfill
LeA	Lenorah fine sandy loam, 0 to 1 percent slopes
LoA	Lofton clay loam, 0 to 1 percent slopes
M-W	Miscellaneous water
MdA	Midessa fine sandy loam, 0 to 1 percent slopes
MdB	Midessa fine sandy loam, 1 to 3 percent slopes
MPC	Midessa and Posey fine sandy loams, 3 to 8 percent slopes
NtC	Nutivoli fine sand, 3 to 8 percent slopes
OcA	Olton clay loam, 0 to 1 percent slopes
PAB	Patricia and Amarillo loamy fine sands, 0 to 3 percent slopes
PeA	Pep loam, 0 to 1 percent slopes
PeB	Pep loam, 1 to 3 percent slopes
PGE	Potter soils, 3 to 20 percent slopes
PoA	Portales loam, 0 to 1 percent slopes
PoB	Portales loam, 1 to 3 percent slopes
PsA	Posey fine sandy loam, 0 to 1 percent slopes
PsB	Posey fine sandy loam, 1 to 3 percent slopes
PsC	Posey fine sandy loam, 3 to 8 percent slopes
RcA	Ranco clay, 0 to 1 percent slopes, frequently ponded
SgA	Seagraves fine sandy loam, 0 to 1 percent slopes
ShB	Sharvana fine sandy loam, 0 to 3 percent slopes
SL	Water, intermittent, salt lake
SpA	Sparenberg clay, 0 to 1 percent slopes, occasionally ponded
TkA	Tokio fine sandy loam, 0 to 1 percent slopes
TkB	Tokio loamy fine sand, 0 to 2 percent slopes
W	Water
YeA	Yellowlake silty clay loam, 0 to 1 percent slopes, rarely ponded
YhE	Yellowhouse gravelly clay loam, 3 to 20 percent slopes
ZmA	Zita loam, 0 to 1 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline & neatline
- Previously Published Survey

OTHER BOUNDARY (label)

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 173, 79 345
- Federal — 287, 410 224
- State — 52, 52 347
- County, farm or ranch — 1283

RAILROAD

POWER TRANSMISSION LINE
(normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad
- Single side slope (showing actual feature location)

DAMS

- Medium or Small

LANDFORM FEATURES

- Prominent hill or peak
- Soil Sample Site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Other Religion (label) — Mt Carmel
- Located object (label) — Ranger Station
- Tank (label) — Petroleum
- Lookout Tower
- Oil and/or Natural Gas Wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

DRAINAGE AND IRRIGATION

- Double-line canal (label) — CANAL
- Perennial drainage and/or irrigation ditch
- Intermittent drainage and/ or irrigation ditch

SMALL LAKES, PONDS AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line — FLOOD POOL LINE

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — AcA LeA

LANDFORM FEATURES

ESCARPMENTS

- Bedrock
- Other than bedrock
- Short steep slope
- Gully
- Depression, closed
- Sinkhole

EXCAVATIONS

PITS

- Borrow pits
- Gravel pit
- Mine or quarry
- Landfill

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava flow
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

AD HOC FEATURES

- Sand dune vegetated
- Caliche, shallow

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
PEP QUADRANGLE
SHEET NUMBER 1 OF 20

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Base maps are orthophotographs prepared by the Natural Resources Conservation Service, from 1996 aerial photography. Hydrography and Cultural layers were aquired from U.S. Department of Agriculture, Natural Resources Conservation Service.
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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

PEP, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 1 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
OKLAHOMA FLAT QUADRANGLE
SHEET NUMBER 2 OF 20

Joins sheet 1, Pep

Joins sheet 3, Lums Chapel

Joins sheet 6, Pettit

Joins sheet 7, Hester Ranch

Joins sheet 8, Whitharral

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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

OKLAHOMA FLAT, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 2 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
LUMS CHAPEL QUADRANGLE
SHEET NUMBER 3 OF 20

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NORTH

SCALE 1:24000

1 0 1 MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETERS

QUADRANGLE LOCATION

LUMS CHAPEL, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
ANTON QUADRANGLE
SHEET NUMBER 4 OF 20

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NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

ANTON, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 4 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
ROUNDUP QUADRANGLE
SHEET NUMBER 5 OF 20

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NORTH

SCALE 1:24000

MILES

FEET

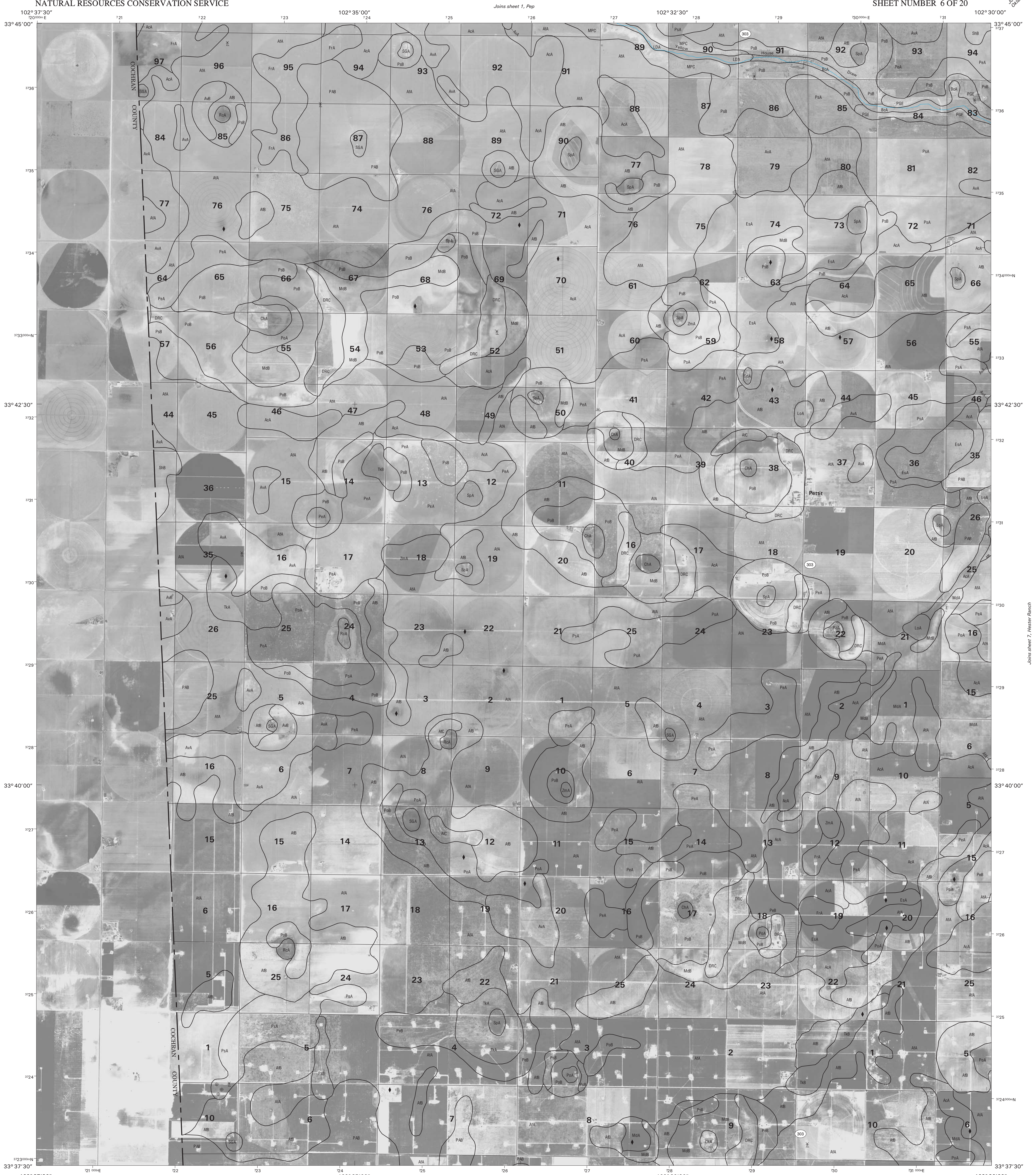
KILOMETERS

QUADRANGLE LOCATION

ROUNDUP, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
PETTIT QUADRANGLE
SHEET NUMBER 6 OF 20



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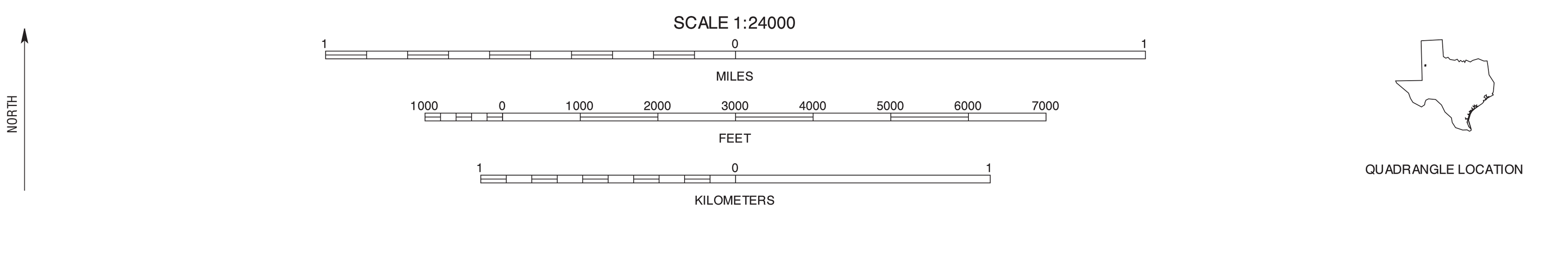

PETTIT, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 20

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NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
HESTER RANCH QUADRANGLE
SHEET NUMBER 7 OF 20

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NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

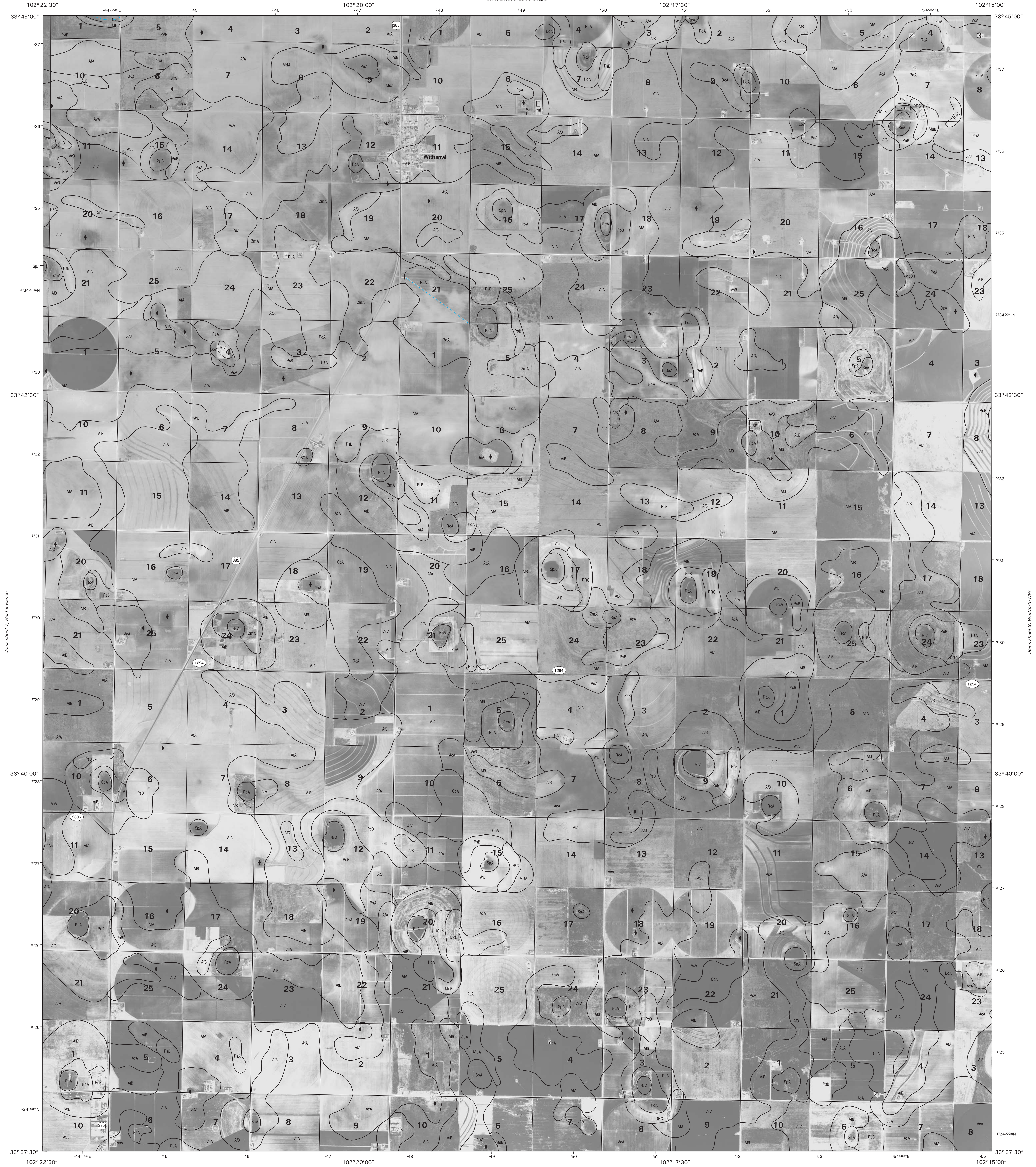
1 0 1
KILOMETERS

QUADRANGLE LOCATION

HESTER RANCH, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 7 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
WHITHARRAL QUADRANGLE
SHEET NUMBER 8 OF 20



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NORTH

SCALE 1:24000

MILES

FEET

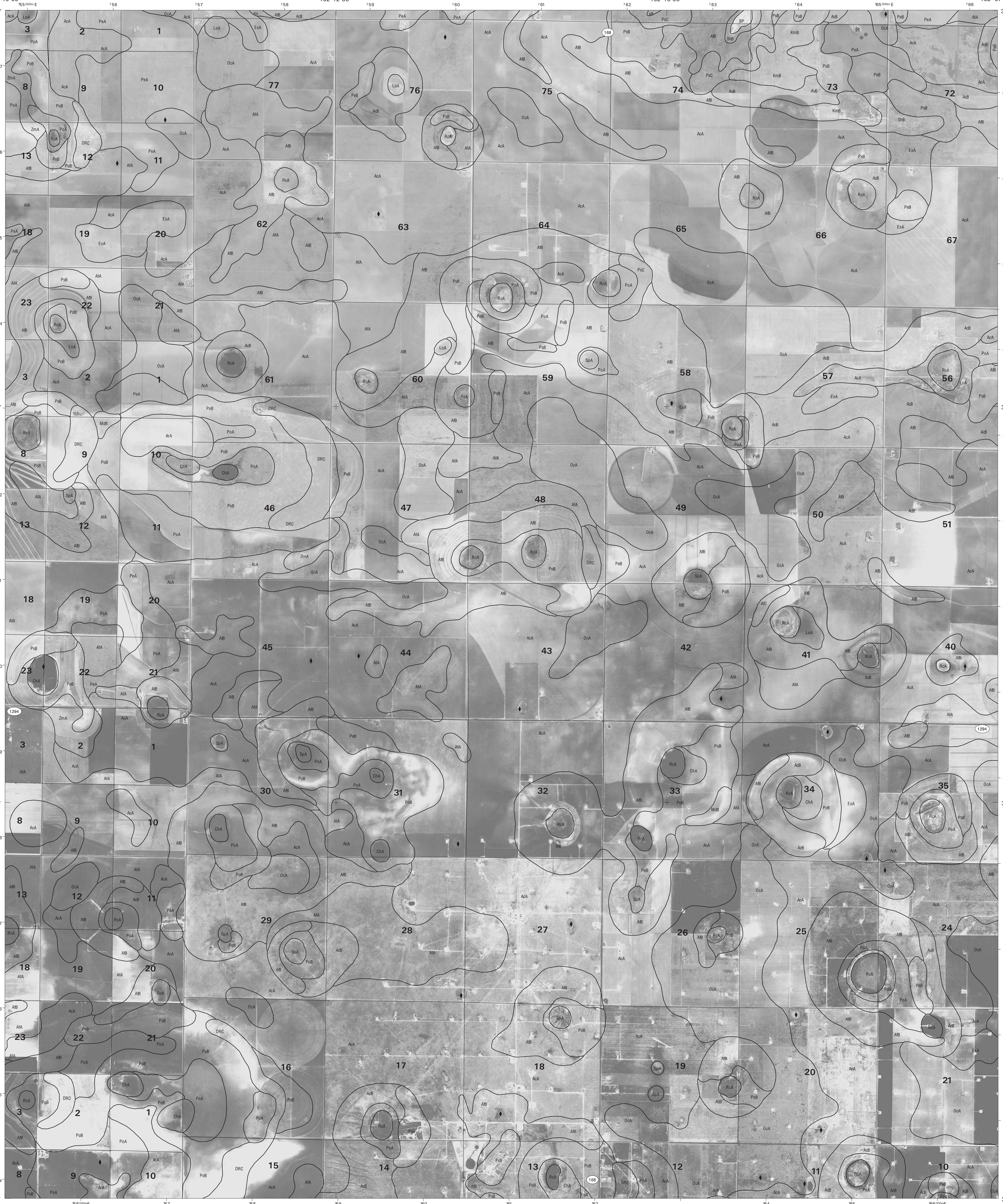
KILOMETERS

QUADRANGLE LOCATION

WHITHARRAL, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
WOLFFORTH NW QUADRANGLE
SHEET NUMBER 9 OF 20



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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

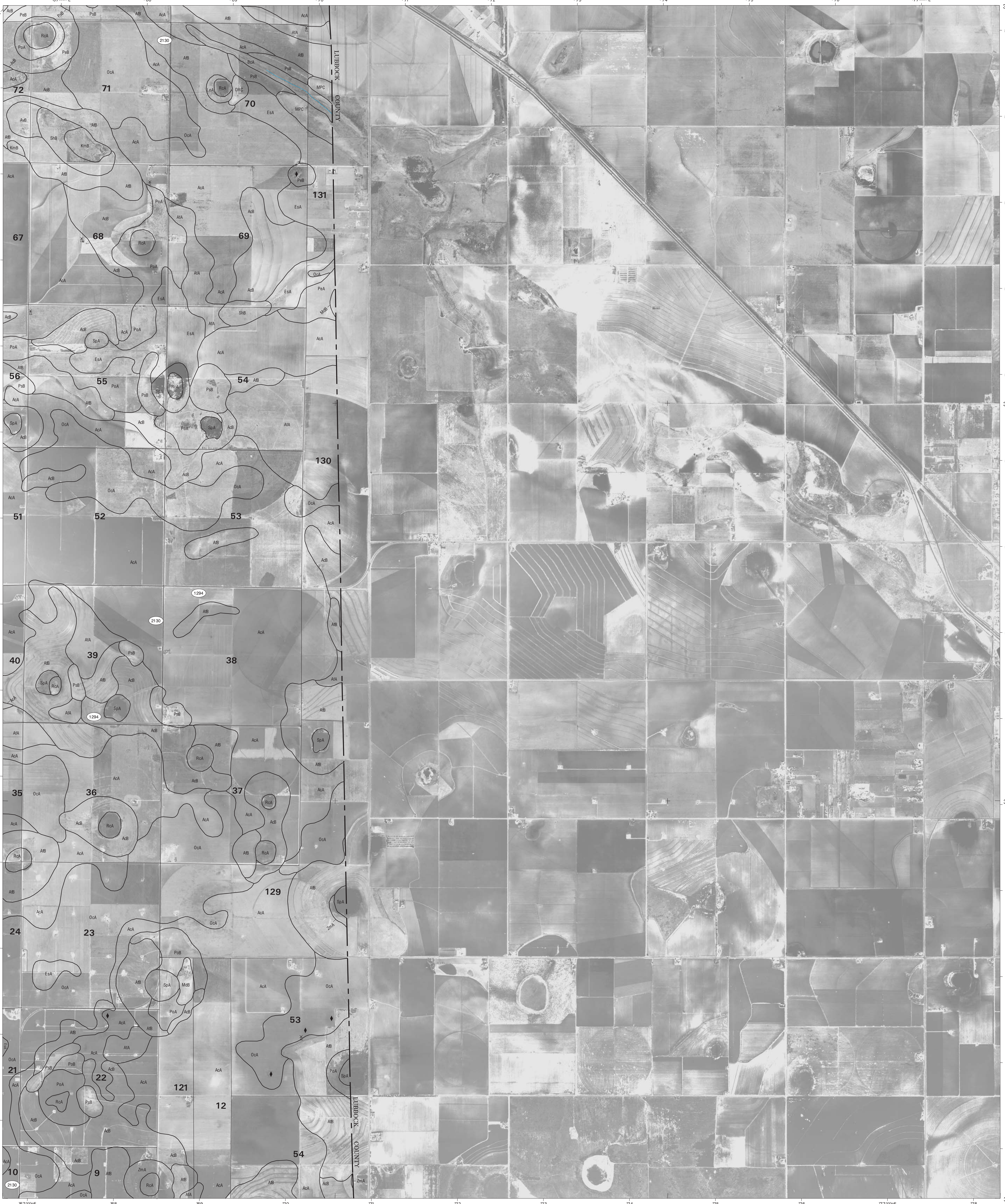
WOLFFORTH NW, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
WOLFFORTH NE QUADRANGLE
SHEET NUMBER 10 OF 20

Joins sheet 4, Anton

Joins sheet 5, Roundup



Joins sheet 9, Wolfforth NW

Joins sheet 15, Wolfforth

Joins sheet 14, Smyer

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Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

WOLFFORTH NE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 20

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NORTH

SCALE 1:24000

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

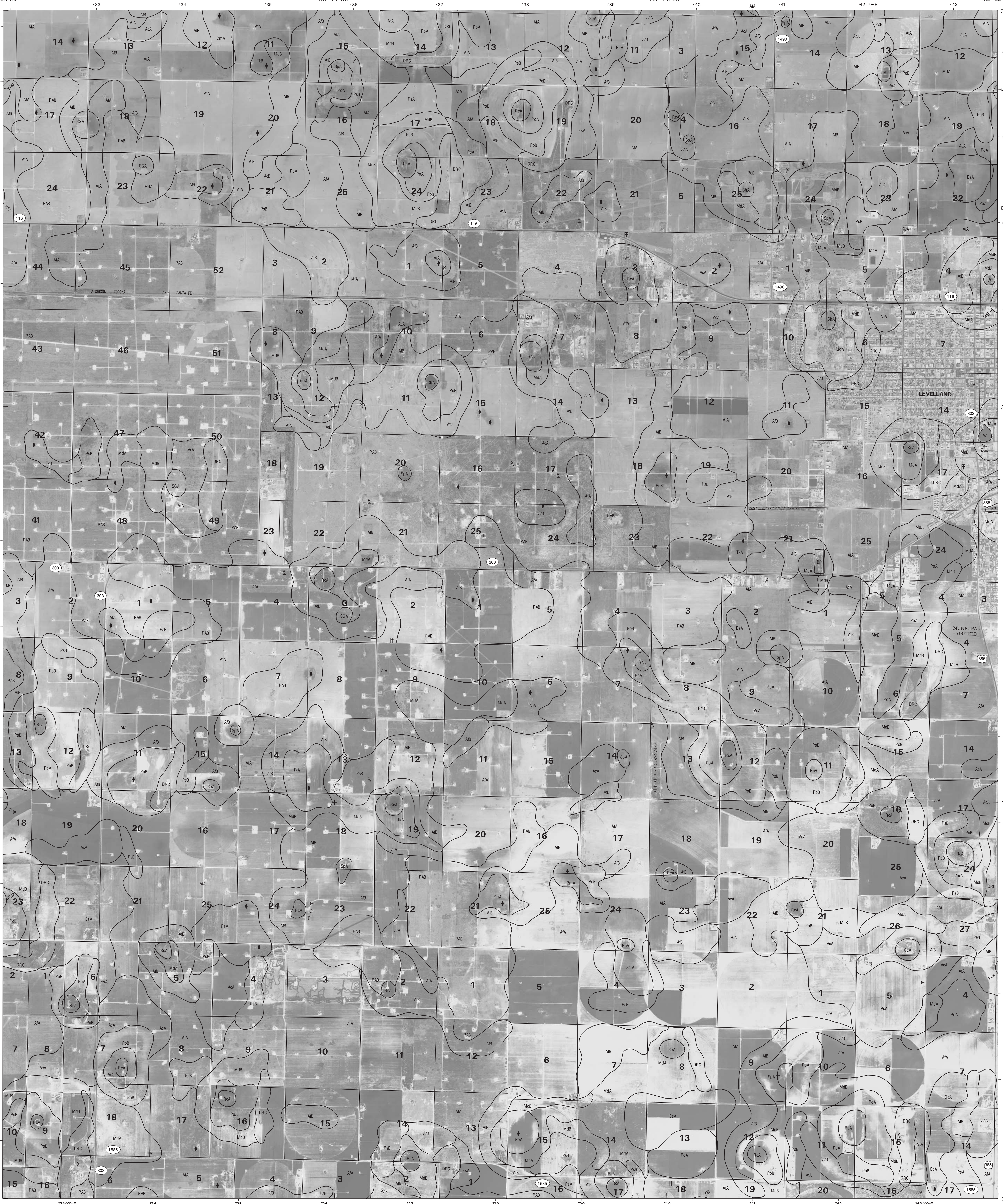
QUADRANGLE LOCATION

WHITEFACE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
LEVELLAND WEST QUADRANGLE
SHEET NUMBER 12 OF 20

Joins sheet 6, Petit
Joins sheet 7, Hester Ranch
Joins sheet 8, Whitharral
Joins sheet 11, Whiteface
Joins sheet 13, Levelland East



Joins sheet 16, Plains 1 NE
Joins sheet 17, Sundown
Joins sheet 18, Locketville

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North American Datum of 1983 (NAD83). GRS-80 Spheroid
1000-meter ticks: Universal Transverse Mercator, zone 13.
Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

SCALE 1:24000

MILES

FEET

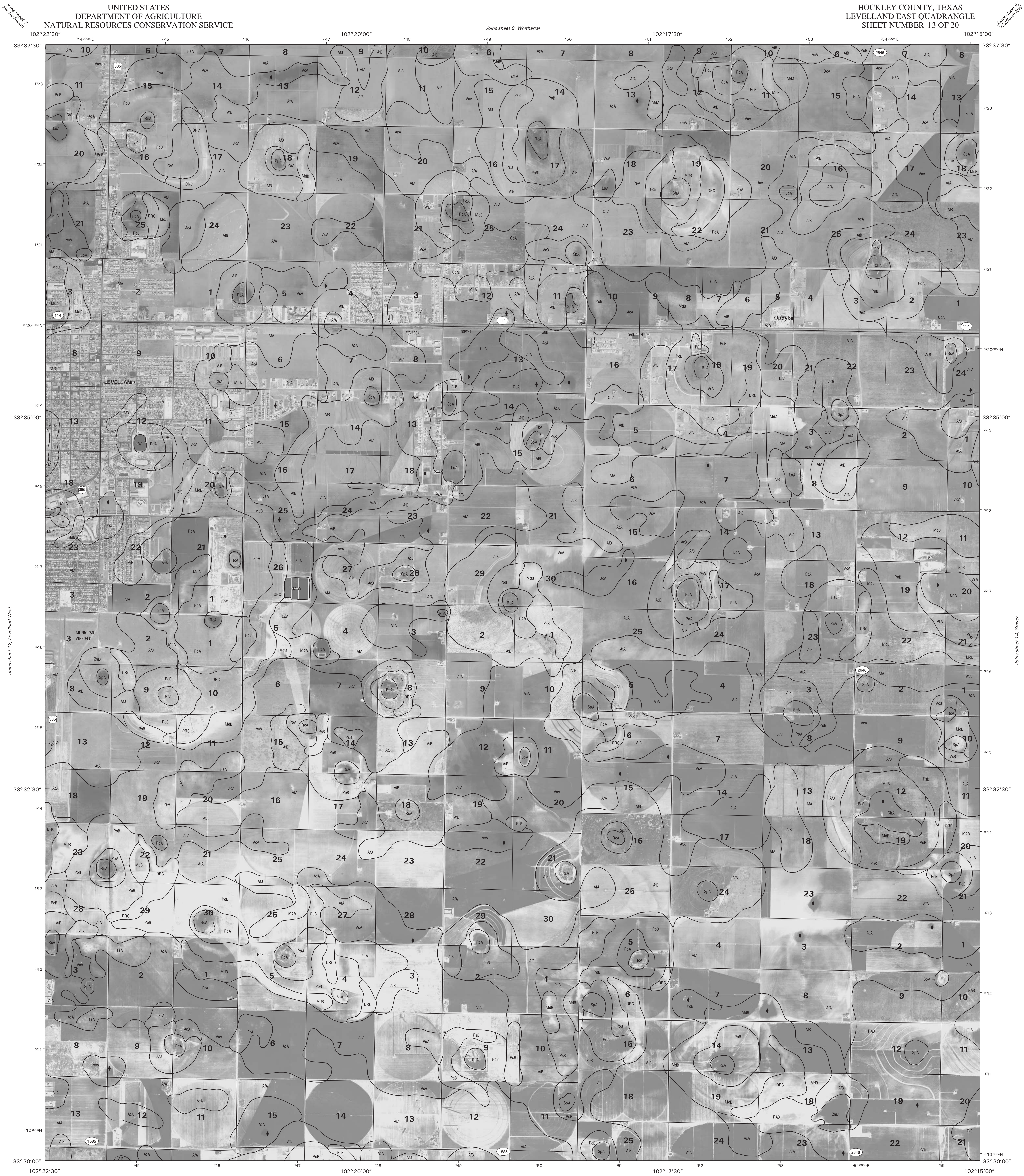
KILOMETERS

QUADRANGLE LOCATION

LEVELLAND WEST, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
LEVELLAND EAST QUADRANGLE
SHEET NUMBER 13 OF 20



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MILES

FEET

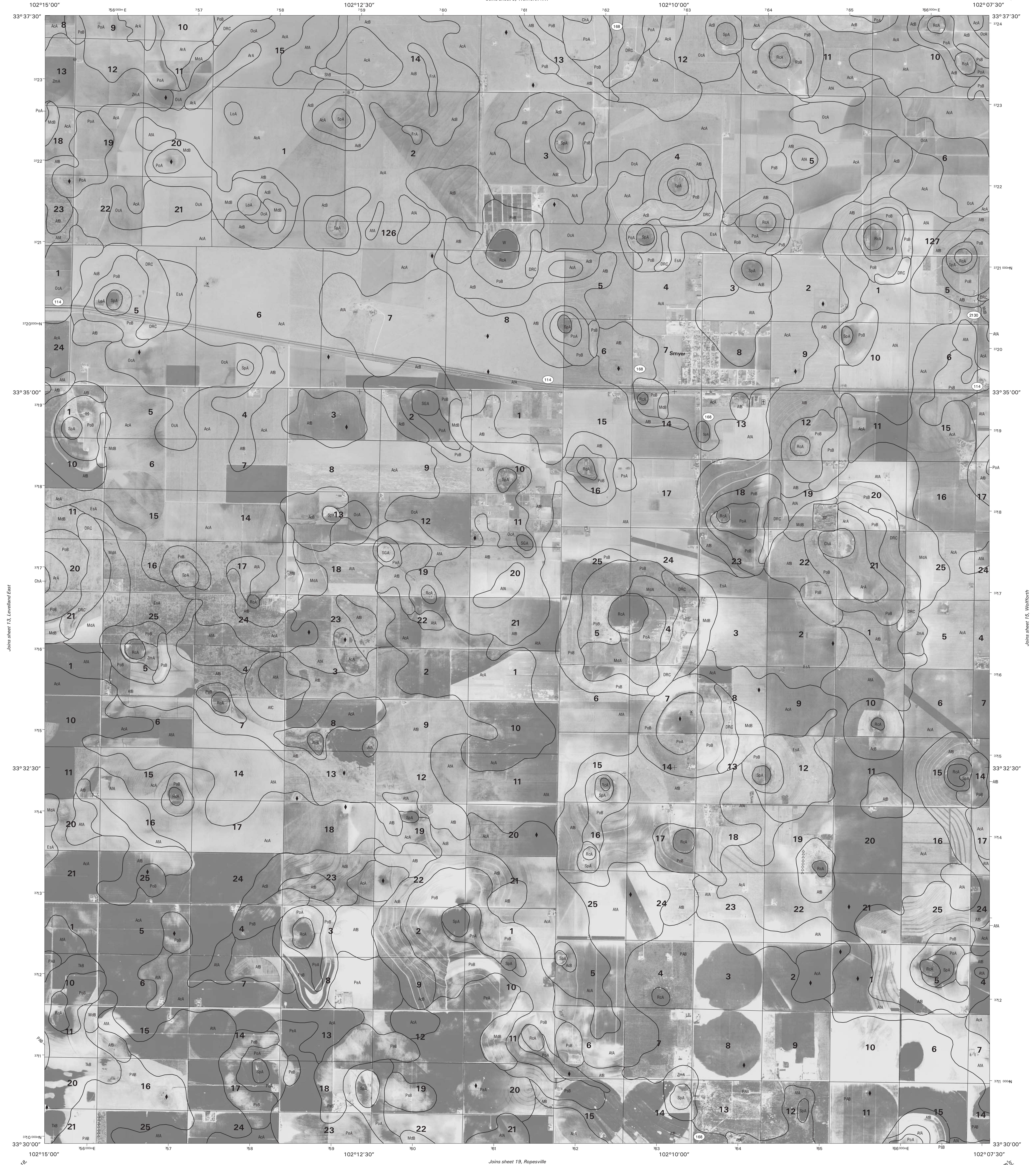
KILOMETERS

QUADRANGLE LOCATION

LEVELLAND EAST, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
SMYER QUADRANGLE
SHEET NUMBER 14 OF 20



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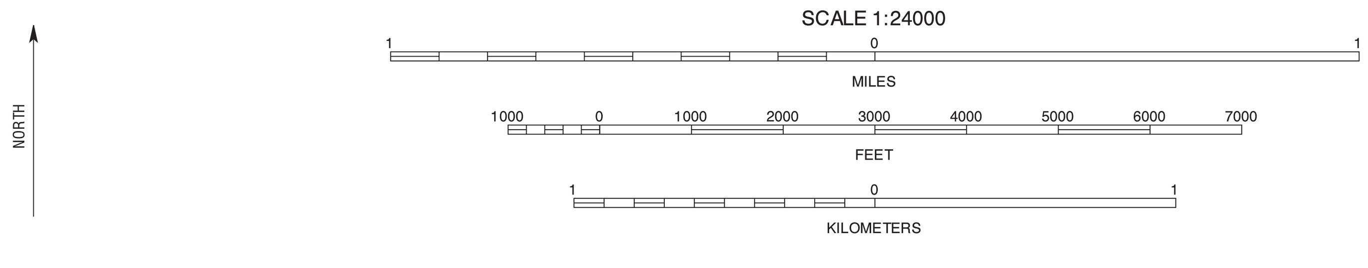
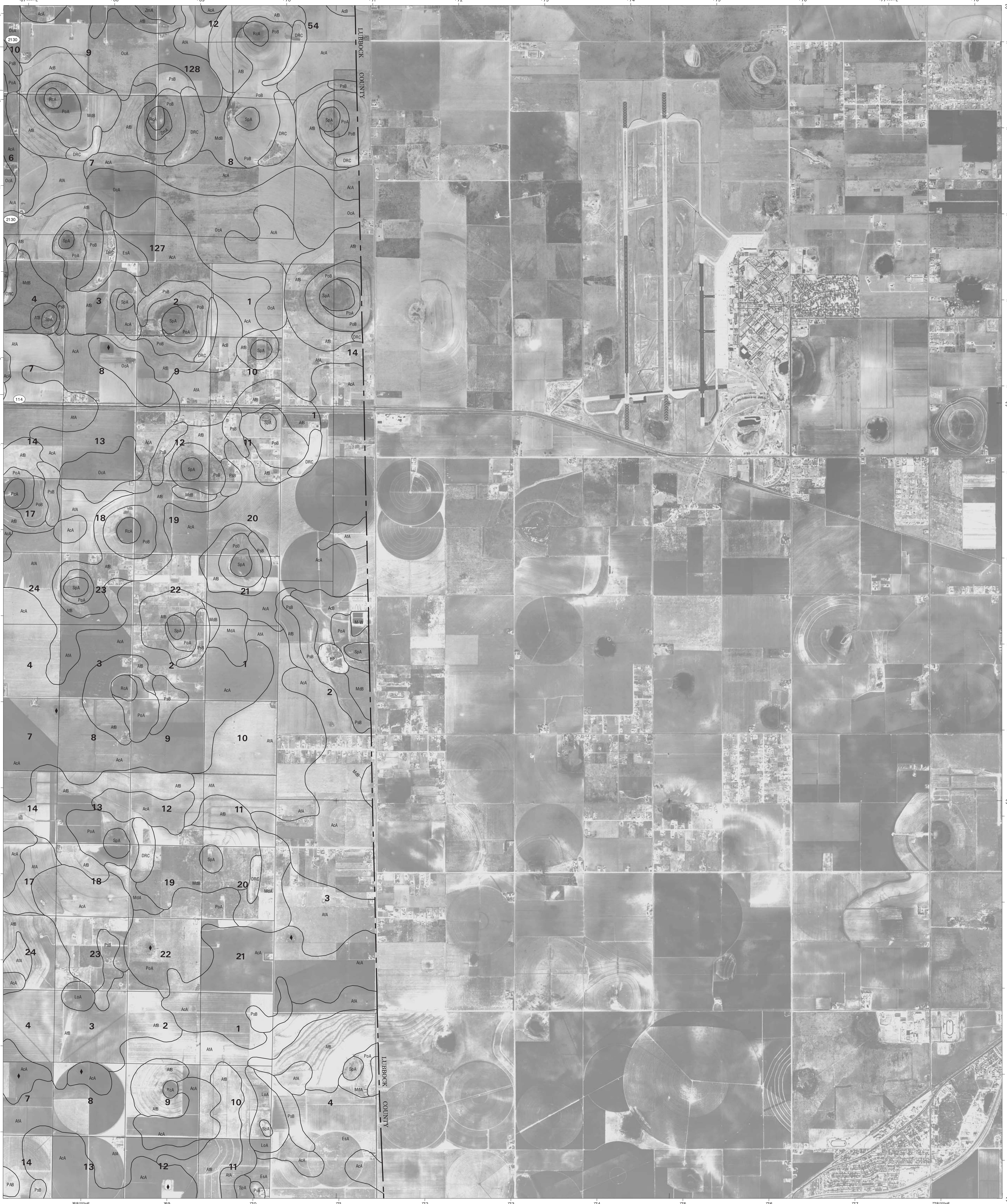


QUADRANGLE LOCATION

SMYER, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 14 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
WOLFFORTH QUADRANGLE
SHEET NUMBER 15 OF 20



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MILES

FEET

KILOMETERS

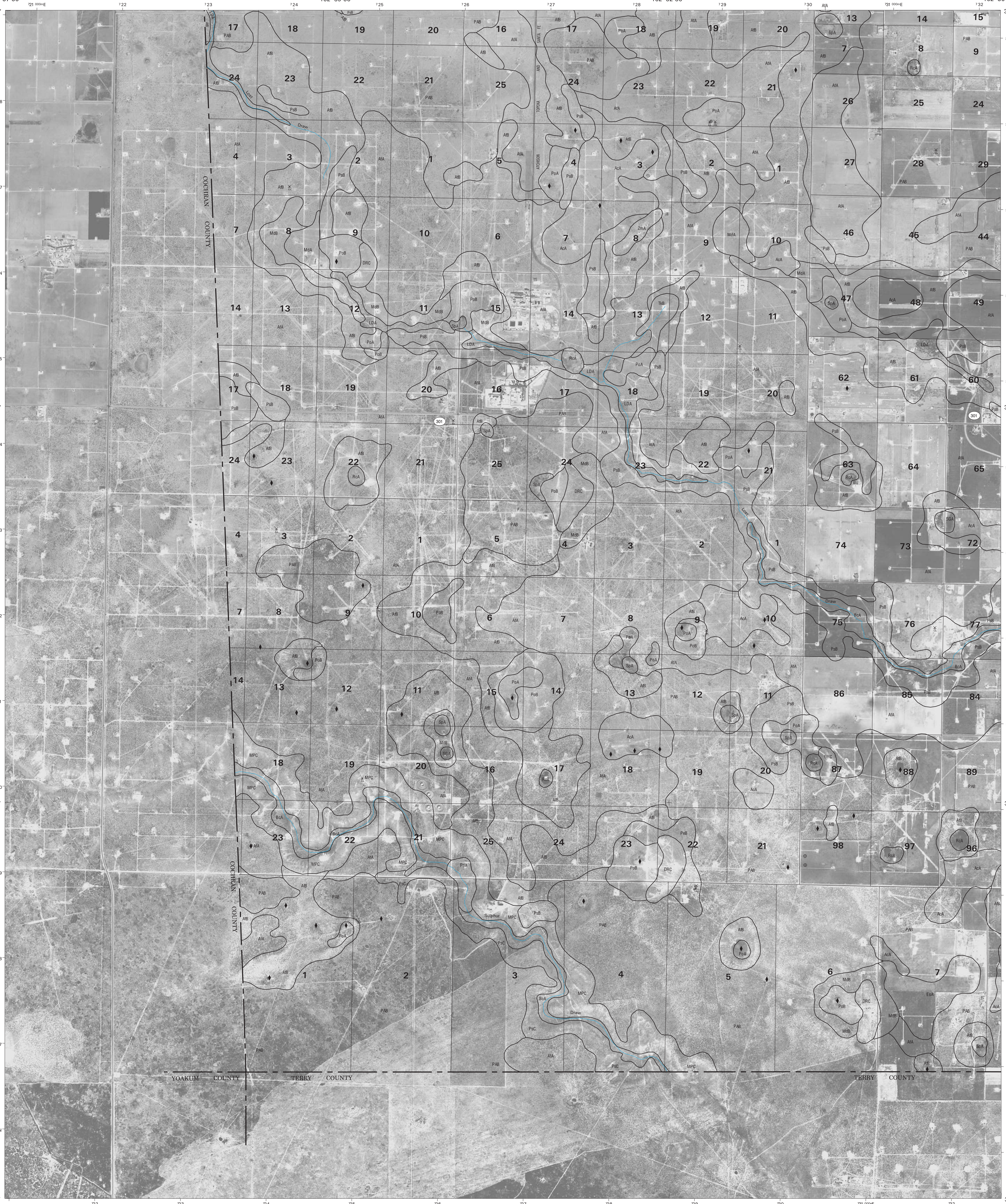
QUADRANGLE LOCATION

WOLFFORTH, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 15 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
PLAINS 1 NE QUADRANGLE
SHEET NUMBER 16 OF 20

Joins sheet 11, Whiteface



Joins sheet 12, Levelland West

Joins sheet 17, Sundown

102° 37′30″ 102° 35′00″ 102° 32′30″ 102° 30′00″
33° 30′00″ 33° 27′30″ 33° 25′00″ 33° 22′30″

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MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

PLAINS 1 NE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 16 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
SUNDOWN QUADRANGLE
SHEET NUMBER 17 OF 20

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MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

SUNDOWN, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 17 OF 20

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MILES

FEET

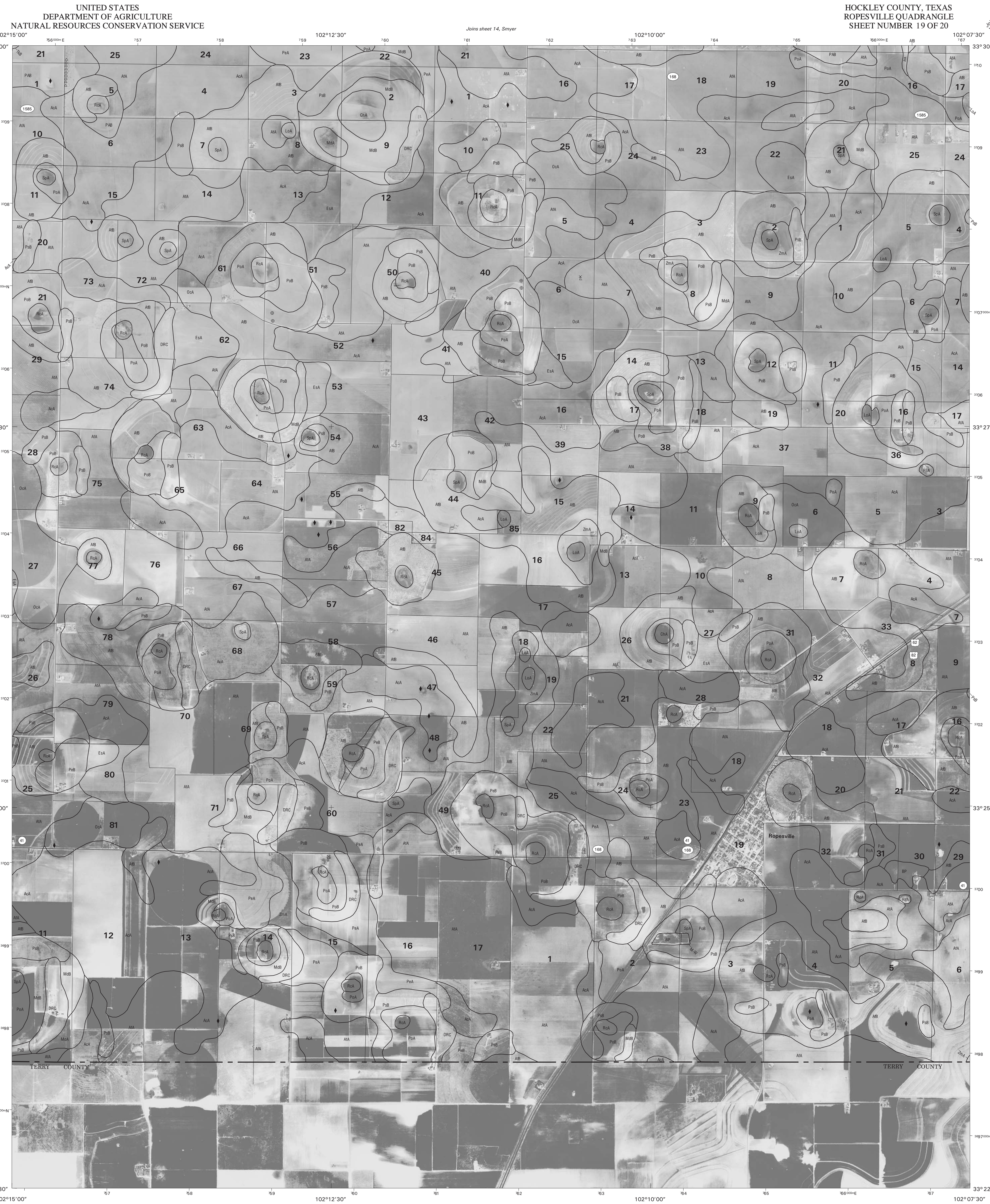
KILOMETERS

QUADRANGLE LOCATION

LOCKETTVILLE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 18 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
ROPESVILLE QUADRANGLE
SHEET NUMBER 19 OF 20



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NORTH

SCALE 1:24000

MILES

FEET

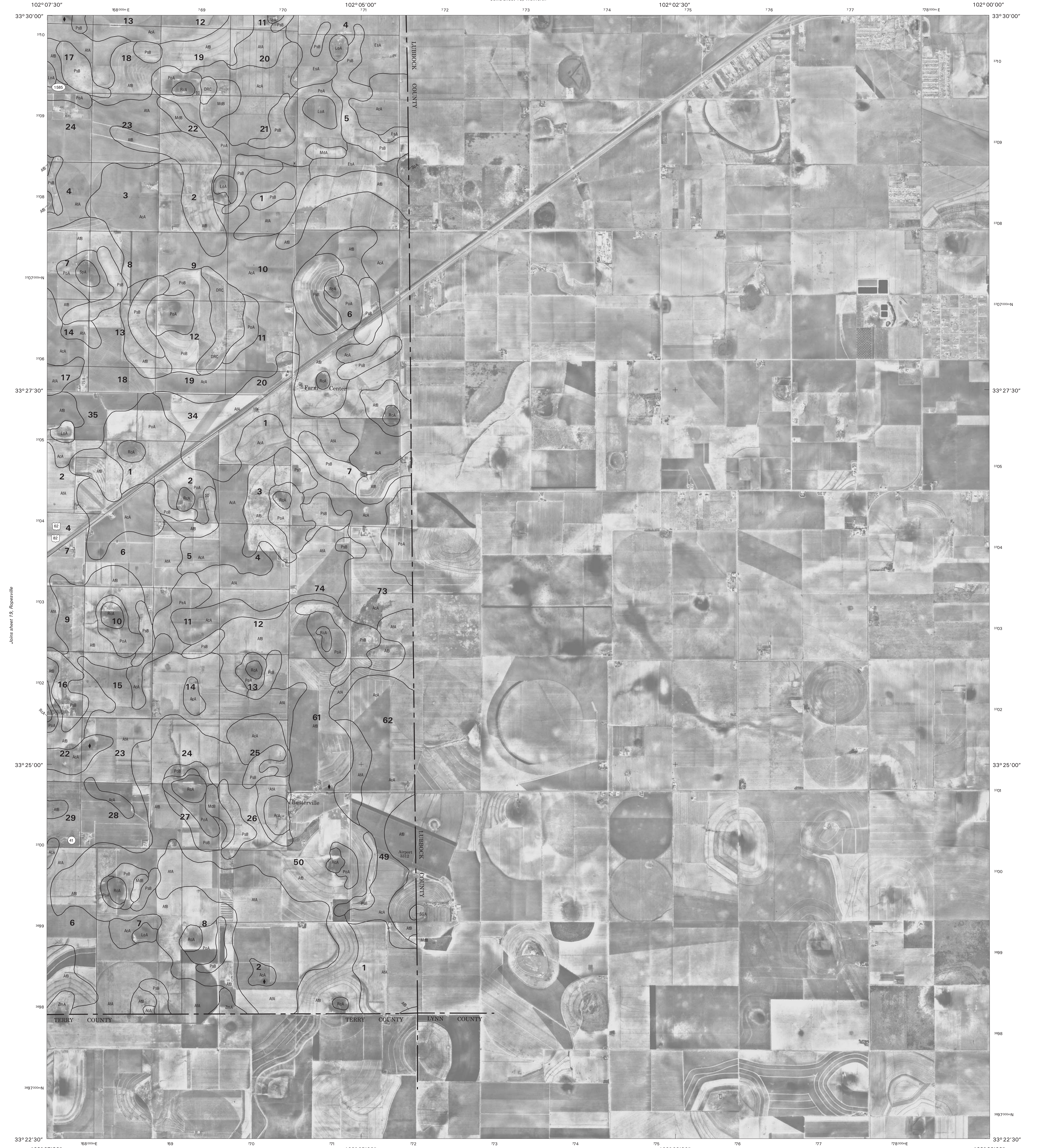
KILOMETERS

QUADRANGLE LOCATION

ROPESVILLE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 19 OF 20

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

HOCKLEY COUNTY, TEXAS
BUSTERVILLE QUADRANGLE
SHEET NUMBER 20 OF 20



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MILES

FEET

KILOMETERS

QUADRANGLE LOCATION

BUSTERVILLE, TEXAS
7.5 MINUTE SERIES
SHEET NUMBER 20 OF 20